LIBRARY
FISH & WILDLIFE SERVICE
PACIFIC OCEANIC FISHERY
INVESTIGATIONS

APR 1954
LIBRARY
POFI
FISH & WILDLIFE
SERVICE

Siboga-Expeditie
XXXV

THE STOMATOPODA OF THE SIBOGA EXPEDITION

BY

H. J. HANSEN
GJENTOFTE (near COPENHAGEN)

With 2 plates

LATE E. J. BRILL
PUBLISHERS AND PRINTERS
LEIDEN — 1926

Q115
S1
No.35-38

1285

THE STOMATOPODA OF THE SIBOGA EXPEDITION

BY

H. J. HANSEN,

Gjentofte (near Copenhagen).

With 2 plates.

More than thirty-five years ago the present writer began the study of the Stomatopoda, both adults and larval forms, as the Copenhagen Museum possesses an uncommonly large collection of older larvæ. Then I visited several European countries and investigated the material of the present order in a fair number of zoological Museums. It was my intention to write a monograph with a large number of figures, but during many years other and generally more pressing topics occupied the time, excepting that in 1895 I finished the report on the Stomatopoda and their larval forms collected by the German Plankton-Expedition. In September 1913 STANLEY KEMP published his big monograph of the Stomatopoda of the Indo-Pacific Region, and the author's treatment of the adult or at least finally developed forms is so well done that I had to give up my idea of writing a monograph, because too much of it would be superfluous.

KEMP's book is in reality one of the best systematic works ever used by me. It is difficult to find any useful specific or generic character not applied by him; I have discovered only two particulars of this kind. In some species of the genus *Squilla* the branchial plates, præepipods, are wanting in fourth, or besides also in third, pair of thoracic legs (the single pair of maxillipeds is not counted by me as thoracic legs); this interesting feature was, as far as I have observed, first pointed out by CALMAN. Furthermore the size and shape of the hand of third thoracic leg, especially as compared with the hand of the fourth, and to a lesser degree with that of third pair, affords a generic character in *Lysiosquilla*, and sometimes their shape and relative size may also be mentioned in the description of species belonging to *Lysiosquilla*, *Coronida*, etc.

I accept KEMP's limitation of species in all cases except as to a single form of *Gonodactylus* (see later on), and as to some forms of the still very imperfectly known genus *Odontodactylus*; in the last-named genus young specimens have been established as separate species. KEMP's

descriptions and figures, his synonymical lists, his excellent bibliography, and his enumeration of all species taken outside the Indo-Pacific Region, all that must be praised. In the enumeration of species I follow KEMP's monograph, inserting the new forms at their proper places; in the descriptions the consecutive order of organs and characters as arranged by KEMP is also generally adopted.

KEMP enumerates in 1913 in all 92 species from the Indo-Pacific Region; besides he says that 139 species and varieties of adult Stomatopoda are known from all seas together. But he mentions besides without number *Squilla minor* Jurich and *S. (Leptosquilla) Schmeltzii* A. M.-Edw.; on *S. minor* I have no opinion, but *Squilla Schmeltzii* must be considered a very good species, as shown later on. On the other hand, I am forced to consider *Gonodactylus Demani* Hend. as being only a variety of *G. chiragra* Fabr., and among the 9 species of *Odontodactylus O. carinifer* Pocock is only a young stage of *O. cultrifer* White, *O. elegans* Miers a young stage of *O. scyllarus* L., while *O. latirostris* Borradaile and *O. Southwelli* Kemp are probably only varieties of *O. Hansenii* Pocock. If these statements are accepted and *S. minor* Jurich considered a valid species, we get in my opinion 89 species in 1913 from the Indo-Pacific. Since that year 1 new species has been established by KEMP (1915), 1 species by EDMONDSON (in 1922), and 3 species by ODHNER (in 1923). The entire fauna of Stomatopoda known in 1923 from the region in question is consequently 94 species belonging to 6 genera; whether any species has been established since 1923 I do not know. The acquaintance with the papers published since KEMP's work lets one suppose that a very moderate or even rather small number of species are still undescribed, but judging from the material collected by the 'Siboga' (and from the number of larval species in the Atlantic of the genus *Lysiosquilla* mentioned by me in 1895) it may be safely concluded that numerous species of adults are still undiscovered.

The 'Siboga' collection of adult and subadult forms is of very moderate size. More than half of the specimens belongs to a single extremely common species, viz. *Gonodactylus chiragra*, and the entire material comprises only 31 species, thus a little less than one-third of the number hitherto known from the Indo-Pacific Region. But now we note the astonishing fact that only 22 species in the collection could be determined, so that 9 species are new to science, viz. 5 species of *Squilla*, 3 species of *Gonodactylus*, and one form is established as type for a new genus, *Coronidopsis*. And it may be added that not only the last-named type shows a curious character, but also one of the species of the genus *Squilla* differs in an interesting and most conspicuous feature from all other species of the order. Only a single specimen, or, in a few cases, two specimens, have been captured of each of the nine species. The most probable explanation is that most species of the order construct burrows in the bottom, so that numerous forms living in depths of more than a few meter below the surface are only casually or very rarely taken by the trawl or the dredge.

More than half-grown larval forms of Stomatopoda can generally be referred to genus, but it is most frequently impossible to refer them to the developed forms. The chief reason is that the last natatory larval stage is not common, while the second and especially the first of the bottom-stages are rare in collections; furthermore that very young specimens — second and especially first post-larval stage — of many species of *Squilla* do not exhibit the specific

characters sufficiently developed for referring them to the adult, as the genus is very large, and most of its smaller groups comprise a few or several species allied to each other and inhabiting the same geographical area. Similar difficulties are observed as to species of the genus *Lysiosquilla*. Species of the type named *Alima* belong all to the genus *Squilla*, but probably it is at present impossible to refer any specimen of *Alima* taken in the Indo-Pacific Region to the adult form. Many larval forms from the Indo-Pacific have been described and figured in the literature by several authors, and it is deemed superfluous to describe and draw more quite undeterminable specimens. But in some few cases older larval stages and the young post-larval stages can be referred with more or less certainty to their adult forms, and later on I attempt to make as much as possible of this topic. The 'Siboga' collection is of very moderate size, but, nevertheless, it contains specimens of interest.

I. Adult (and half-grown) Stomatopoda.

Stanley Kemp: An Account of the Crustacea Stomatopoda of the Indo-Pacific Region (Memoirs of the Indian Museum. Vol. IV, N° 1. Calcutta. September 1913, 4°).

As Kemp gives complete synonymical lists at all species, and every student of forms of the present order must have his book at the elbow, I refer always to that monograph, but otherwise only to the most important of earlier publications at each species.

Squilla J. C. Fabr.

Kemp mentions (with number) 34 species from the Indo-Pacific Region of this very large genus. The 'Siboga' material comprises specimens of only 13 species, and it is rather surprising that 5 of these species can not be referred to those described by Kemp. One of the new forms is allied to *S. microphthalma* and belongs unquestionably to the group established by Miers as the genus *Chloridella*; of another undeterminable form of the same group the 'Siboga' has captured two specimens too small for the establishment of a new species and therefore not mentioned in the following pages. From these facts I am inclined to conclude that our knowledge of the species of *Squilla* with small or very reduced eyes is still rather imperfect. Of the four other new species two are more or less allied to *S. fasciata* de Haan; the fourth is not very distant from *S. (Leptosquilla) Schmeltzii* A. M.-Edw., but still more aberrant from all forms of the whole family. The fifth species belongs to the *oratoria*-group, but has seven or eight spines on the dactylus of the raptorial claw.

1. *Squilla verrucosa* n. sp. Pl. I, figs. 1*a*—1*d*.

Stat. 47. Dec. 8. Lat. 8° 0′ S., long. 118° 34′.7 E. 13—31 m. 1 juvenile specimen, 24 mm. long.
Stat. 306. Febr. 8. Lat. 8° 27′ S., long. 122° 54′.5 E. 247 m. Sandy mud. Trawl. 1 adult male, 45.5 mm. long.

Description. — This species belongs to the *Chloridella*-group, and is on the whole related to *S. microphthalma* H. M.-Edw. and perhaps more to *S. chlorida* Brooks.

The surface of the carapace (fig. 1 *a*) is smooth without punctuation. Anteriorly the carapace is half as broad as long in the median line, and its greatest width is equal to its median length. The ridge close to the inner edge of the gastric groove is indistinct excepting far in front and backwards towards the cervical groove; furthermore a portion of the marginal ridge defines the posterior edge of the carapace on either side and is curved internally, extending forwards for a short distance on the surface of the carapace which has no other ridges. The sharp teeth at the antero-lateral angles, owing to the strong curvature of the anterior margin, are far from reaching the level of the rostral line. The organ at the posterior end of the median line is a very conspicuous, oblong tubercle.

The rostrum (fig. 1 *a*) is conspicuously longer than broad, in the main oblong-triangular, with the obtuse end rounded. Its anterior half has the lateral margins a little upturned and in the large specimen a distinct median keel, which is obsolete in the small specimen. (The transverse line drawn in fig. 1 *a* exists only in the large, not in the small, specimen; its origin is perhaps artificial).

The eyes (figs. 1 *a* and 1 *b*) are somewhat similar to those in *S. microphthalma* as represented by KEMP; they reach in the large specimen to near the end of first antennular joint, in the small specimen considerably beyond that end. The cornea is in the small specimen about two-thirds the maximum width of the stalk, and its greatest breadth is about one-third the length of the whole organ; in the large specimen the left eye (fig. 1 *b*) has its cornea larger, about three-fourths the maximum of the stalk, while the right eye has the cornea misshapen (fig. 1 *a*). The internal surface of the stalk is not distinctly flattened.

The antennular peduncle is somewhat shorter than the carapace excluding the rostrum. — The antennal squama when stretched forwards reaches at most to the end of the peduncle of the endopod. — The mandibular palp is well developed, three-jointed.

In the raptorial claw (fig. 1 *c*) merus, carpus, and propodus agree completely with KEMP's description of the same joints in *S. Latreillei* and *S. microphthalma*. The dactylus differs materially from that in the last-named forms in being less robust, and its five teeth, including the apical one, are proportionately longer, more slender and more curved than in the other species of the *Chloridella*-group figured by WOOD-MASON and by KEMP. Dactylus has also a very conspicuous notch near the base.

In third pair of thoracic legs the hand is distinctly a little longer than broad and not larger than the hand of fourth pair, but the latter is oblong-quadrangular. No præepipod at the base of fourth leg, but præepipods are found on second and third legs.

Fourth thoracic segment (fig. 1 *d*) is laterally produced into a somewhat long and acute process curved moderately forwards. The tooth on the lower surface is much smaller than the lateral process, slender, spiniform and acute.

The three posterior thoracic segments (fig. 1 *d*) without any trace of submedian carinæ, while the intermediate carinæ are well developed. The lateral margins of fifth and sixth segments are slightly upturned and truncately rounded; those of seventh segment are produced forwards and outwards as free triangular plates curved a little upwards and with the end acute. — The exopods of the legs of these segments are flattened, and those of fifth legs are very oblong-oval.

The five anterior abdominal segments have the intermediate, lateral and marginal carinæ

well developed; on fifth, fourth, and third segment all these carinæ terminate in spines in the large specimen, while on first segment they have no spines, and on second segment the intermediate and the lateral keels terminate in spines. (In the small specimen spines are wanting on second and third segments). Submedian carinæ are wanting on the three anterior segments; they are faint on the fourth, and rather short but very distinct and nearly parallel on fifth segment. Second to fourth segments each with a small protuberance in the median line; the same segments have besides a pair of transversely impressed points considerably from the median line.

On sixth abdominal segment the submedian and lateral carinæ are sharp, while the intermediate carinæ are thicker and besides distinctly curved.

The telson is considerably broader than long and considerably vaulted dorsally; in outline and general appearance it is rather similar to that in the female *S. decorata* (KEMP, fig. 15), but the tubercles in the longitudinal rows are less numerous on the postero-lateral parts of the dorsal surface. The submedian marginal teeth are short, with about three pairs of denticles in the median excavation; the intermediate teeth are somewhat longer than the submedian pair, and the number of denticles in the intermediate serration is seven in the large, six in the small, specimen. The lateral teeth are moderately developed, with a denticle in the excavation. The median carina is very conspicuous, without notch at the base, and terminates in a spine. Along this carina a pair of longitudinal, nearly obsolete keels, each with about four well-sized tubercles. The posterior part of the upper surface has four or five pairs of longitudinal, feeble and on the whole short keels, each armed with a few tubercles, and all tubercles are, seen from the side, a little oblique-triangular, with the end acute. The anterior part of the surface has some irregular tubercles, several among them rounded. The large specimen is a male and it has a somewhat high but only moderately large swelling at the base of each marginal tooth. The ventral surface of the telson is quite smooth except for the moderately long and high post-anal crest.

The peduncle of each uropod has above two sharp keels, and at the end the usual spine; its ventral plate is shaped as in *S. decorata* and has 8 or 9 spines on the inner margin. First joint of the exopod with 7 or 8 flattened marginal spines; the ultimate spine is about twice as long as the preceding one.

The greyish colour affords no specific character; black pigment seems to be nearly wanting.

Remarks. — *S. verrucosa* is well separated from the other forms of the *Chloridella*-group by the length and shape of the lateral processes on fourth thoracic segment, together with the oblong rostrum; the length and slenderness of the teeth on the dactylus of the raptorial claw are also characteristic. The presence of the mandibular palp, the shape of the eyes and the absence of submedian keels on the three anterior abdominal segments, while keels are distinct on fourth and fifth segments, are useful features. Whether any of the other species of the group has most of the tubercles on the surface of the telson acute, cannot be seen in the literature.

2. *Squilla fasciata* de Haan.

1844. *Squilla fasciata* De Haan, in Siebold's Fauna Japonica, Crust., Atlas, Pl. LI, fig. 4.
1913. *Squilla fasciata* Kemp, op. cit. p. 34, Pl. I, figs. 21—23.

Stat. 7. March 11. Lat. 7° 55′.5 S., long. 114° 26′ E. 15 m. and more. Coral and stones. Dredge and shore-exploration. 1 very small specimen.
Stat. 51. April 19. Southern part of Molo-strait. 54—90 m. 1 very small specimen.
Stat. 77. June 10. Lat. 3° 27′ S., long. 117° 36′ E. Borneo-bank, 59 m. Fine, grey coralsand. Dredge. 1 half-grown specimen.
Stat. 86. June 18/19. Anchorage off Dongala, Palos-bay, Celebes. 36 m. Fine, grey mud. Trawl. 1 adult specimen, crushed anteriorly and therefore determined as "probably".
Stat. 114. July 8. Lat. 0° 58′.5 N., long. 122° 55′ E. Kwandang-bay-entrance. 75 m. Hard sand, very fine. Dredge. 4 specimens; 2 among them scarcely full-grown, the 2 others small.
Stat. 318. Febr. 22. Lat. 6° 36′.5 S., long. 114° 55′.5 E. 88 m. Fine, yellowish grey mud. Trawl. 1 adult specimen.

It may be remarked that in this species no præepipod is found at the base of fourth thoracic legs, but on the preceding pairs.

Distribution. — This species is known from the Andamans through the East-Indian Archipelago to the Chinese waters and northwards to Japan (see KEMP, p. 36).

3. *Squilla ambigua* n. sp. Pl. I, figs. 2*a*—2*e*.

Stat. 313. February 14—16. Anchorage East of Dangar Besar, Saleh-bay. 36 m. 1 specimen, male, 27.6 mm. long.

Description. — This fine species is somewhat allied to *S. fasciata* De Haan, but differs considerably in several features.

The dorsal surface of the carapace is smooth, without trace of punctuation. The carapace is oblong and anteriorly conspicuously less than half as broad as long (fig. 2*a*), while the greatest breadth measured (in the natural state) in front of the postero-lateral angles is manifestly shorter than its median length and twice as long as the breadth near the anterior margin. A ridge runs very close to the edge of the gastric groove from near its front end to the cervical groove, but no other carina is found on the carapace. The sharp teeth on the antero-lateral angles, owing to the strong curvature of the anterior margin, are rather far from reaching the level of the rostral base. The organ near the posterior end of the median line is well developed. The rostrum (fig. 2*a*) is a good deal longer than broad, in the main oblong-triangular with the end rounded. Its surface is smooth, but in a certain light one observes a rudimentary median keel on its distal half.

The eye-stalks (fig. 2*a*) increase somewhat, but not much, in breadth from the base to the cornea, which is somewhat broader than the end of the stalk, well developed though of very moderate size and bilobed. The eyes reach considerably beyond the middle of second antennular joint.

The antennular peduncle (fig. 2*a*) is short, scarcely half as long as the median line of the carapace. The antennular segment is proportionately long, with the antero-lateral angles produced into comparatively long and slender processes. — In the antennæ the peduncle of the endopod reaches about to the middle of the cornea; the squama is small and reaches scarcely to the end of the peduncle of the endopod.

The mandibular palp seems to be completely wanting.

The outer inferior margin of the raptorial claw (fig. 2*b*) is bluntly rounded (only the right appendage is preserved). The dorsal carina of the carpus is low, sharp, and terminates

a little from the end in a slightly produced, acute angle; externally the carpus has the surface smooth and a groove towards the end. The propodus has as usual three proximal movable spines, the proximal one very long and twice as long as the second, besides a series of fine pectinations along the margin opposed to the dactylus. The dactylus has four slender teeth including the terminal one, and besides a quite rudimentary proximal tooth; it has a small notch near the base of the other margin above the rounded posterior angle.

The hand of third leg broader than usual in the present genus, about as broad as long, and a little shorter but a good deal broader than the hand of fourth leg. Præepipod wanting at the base of fourth leg.

Fourth thoracic segment (fig. 2 *a*) without any dorsal carina; it is produced laterally into a middle-sized, acute process which is turned much downwards and so feebly forwards that seen from above scarcely more than a procurved small apex is visible; the process on the inferior side is, seen from the side (fig. 2 *c*), long, thick at the base, acute and curved considerably forwards. — The three posterior thoracic segments without submedian keels, but each has a transverse row of four impressed points, and the intermediate keels are very distinct. The lateral margins of fifth and sixth segments are scarcely upturned, but somewhat obliquely truncate and posteriorly rounded; seventh segment is laterally produced as a short, subacute lobe.

The abdominal segments (fig. 2 *d*) are greatly depressed. The five anterior segments without submedian carinæ, but with the intermediate and the lateral keels well developed and the marginal keels moderately developed; all these keels without terminal spines. The six carinæ on sixth segment terminate in spines; a median keel is wanting.

The telson (fig. 2 *d*) is almost half as broad again as long and very moderately vaulted. The submedian teeth of the posterior margin are somewhat short and much broader than long, each with six denticles on the inner margin, while the margin between the end of a submedian tooth and the moderately well developed intermediate tooth has seven denticles; the lateral teeth are rather small. The surface has a rich ornamentation; the median carina is narrow, sharp and terminates in a spine a little before the median excavation; the anterior central part of the surface has on each side of the median carina three longitudinal keels, and more laterally some rounded or oblong protuberances are observed. On each postero-lateral area of the surface six longitudinal keels which terminate somewhat before the posterior margin; finally at each side of the end of the median carina a short and oblique keel. The ventral surface (fig. 2 *e*) has thirteen keels in all; a median keel runs from near the anus to somewhat from the median excavation, and at each side of this keel and more forwards two keels, the inner one somewhat short and feeble, the outer, reaching considerably more forwards, is much more strongly developed and a little curved. Furthermore each postero-lateral area of the ventral surface has somewhat from the hind margin four in the main longitudinal keels, and rather near the median line and somewhat obliquely behind the keel mentioned a pair of tubercles.

The peduncle of the uropods (fig. 2 *d*) has dorsally a sharp longitudinal keel and near its end a well developed spine. The plate-shaped process is broad and somewhat long with 6 or 7 spines along the inner margin; the inner tooth is long and broad, almost four times as long as the outer spiniform tooth, while it terminates in a spine about as long as the outer tooth, and at its base a very pronounced rounded lobe is observed. First joint of the exopod

with 5 movable, flattened spines, the two proximal spines very short, the fifth between two and three times as long as the fourth; second joint is very oblong, nearly as long as the first. The endopod reaches scarcely to the end of the terminal spine of the large plate; it is narrow and considerably curved.

The single specimen has almost the whole dorsal surface of the body covered with brownish or blackish chromatophores, which are more or less confluent, thus forming darker or blackish bands or spots on several parts. The carapace has a broad transverse band in front of the cervical groove, and its postero-lateral parts are black. The most lateral parts of the four free thoracic segments and of the five anterior abdominal segments are partly blackish, especially on fifth segment; the telson is dorsally black at the three outer postero-lateral keels; the distal part of the first joint of the exopod of the uropods, a part of its second joint, and most of the distal portion of the endopod are also black.

The length of the single specimen, a male, is as stated above only 27.6 mm., but judging from the length of the copulatory tubes from seventh thoracic legs I suppose that it has arrived at sexual maturity, but that it has not reached its full length.

Remarks. — This new species is abundantly distinguished from *S. fasciata* by the very oblong rostrum, no mandibular palp, only four really developed spines on dactylus of the raptorial claw, no terminal spines on the carinæ of the five anterior abdominal segments, finally by the carinæ of the telson both on its dorsal and its ventral surface. It is, however, more allied to *S. fasciata* than to any other form, but in certain particulars it is intermediate between that species and some of the species with small eyes (*Chloridella* Miers).

4. *Squilla incerta* n. sp. Pl. I, figs. 3*a*—3*c*.

Stat. 154. August 14. Lat. 0°7′.2 N., long. 130°25′.5 E. 83—59 m. Grey muddy sand, shells and Lithothamnion. Dredge. 1 male specimen, 24 mm. long.

Description. — This species is allied to *S. fasciata* and *S. miles*, but it is abundantly distinguished from both in several features.

The carapace (fig. 3*a*) is dorsally smooth, and except for an indistinct ridge running close to the inner edge of the gastric groove, and far backwards a somewhat short rudiment of the lateral carina, the only carina is a short portion of the marginal one; this carina defines the posterior edge of the carapace on either side and is curved internally, extending forwards for a short distance. The antero-lateral angles are rounded.

The rostrum (fig. 3*a*) is a little longer than broad, distinctly tapering from the base to the rounded end, and with a feeble median keel on slightly less than its anterior half.

The eyes (fig. 3*a*) are very compressed, broad; the cornea is bilobed, slightly oblique on the stalk, but its breadth is distinctly less than the length of the whole organ, while it is a little broader than the stalk. On the outer side the stalk is nearly twice as long as the cornea.

The antennular peduncle (fig. 3*a*) is scarcely as long as the carapace in the median line, except the rostrum. — In the antennæ the peduncle of the endopod reaches slightly beyond the apex of the squama.

The mandibular palp is entirely absent.

The outer inferior margin of the merus of the raptorial claw is bluntly rounded (fig. 3 *b*). The dorsal carina of the carpus is low but sharp and terminates abruptly considerably before the end of the joint. The propodus has proximally the usual three movable spines, and the series of fine pectinations is developed along nearly the whole margin. The dactylus has six well developed teeth, including the terminal one, and near the base of the opposite margin a notch and a rounded protuberance.

The hand of third leg distinctly longer than broad and somewhat larger than that of fourth leg; the præepipod at the base of third leg very small, while it is wanting at fourth leg.

The fourth thoracic segment (fig. 3 *a*) protrudes, when seen from above, on each side as a moderately narrow protuberance with the end obtuse and rounded, but at a closer inspection in an oblique direction it is observed that that protuberance is the dorsal part of a subvertical, rather short lateral keel. The spines on the lower side of the segment are rather long, strong, procurved and acute. The three posterior segments without any trace of submedian carinæ, while the intermediate keels are well developed; the lateral margins of fifth and sixth segment are truncately rounded, while those of seventh segment are shaped as a low triangle, with the apex above the base of the leg obtuse.

The abdomen is considerably convex, and its surface looks somewhat polished. The five anterior segments (fig. 3 *c*) have no trace of submedian carinæ, while the intermediate, lateral and marginal carinæ are well developed. In the single young specimen all these carinæ have no terminal spines, and the postero-lateral angles of all five segments are rounded. Sixth segment with the usual six carinæ, all terminating in short spines.

The telson (fig. 3 *c*) is somewhat convex and considerably broader than long. The six marginal teeth are acute and rather short; there are four pairs of submedian and eight pairs of intermediate denticles. The median carina is not high but sharp and terminates in a well developed spine; outside this carina a pair of keels converge from before backwards to somewhat before the end of the median carina, and outside the proximal third of each of these converging carinæ is found a parallel keel. The keel on each of the submedian teeth is prolonged forwards beyond the posterior end of the median carina; besides each postero-lateral part of the surface possesses four moderately short, longitudinal, nearly parallel keels, all terminating a little from the hind margin. Consequently the entire surface has in all seven pairs of keels in addition to the median keel. The lower surface has only a distinct post-anal keel.

The peduncle of the uropods (fig. 3 *c*) has the usual dorsal keel terminating in a spine. The ventral plate is long and broad with eleven sharp spines on the inner margin in the left uropod and twelve in the right; the bifurcation is shorter than in many species and the long branch has considerably more than its proximal half very broad, while the distal portion beyond the lobe-shaped protuberance is a very slender spine, which is considerably shorter than the outer, spiniform branch. The first joint of the exopod has on the left uropod six, on the right uropod five spines, not much flattened but acute; the terminal spine is considerably less than twice as long as the preceding one.

The colour is not characteristic, only with some brownish spots.

As already stated, the single male specimen is only 24 mm. long, but the copulatory tubes from the last pair of thoracic legs have seemingly arrived at full length.

Remarks. — I venture to establish *S. incerta* on the single rather small specimen, but by the combination of several features as the shape of the rostrum, the not common shape of the eyes, no mandibular palp, six teeth on the raptorial dactylus, no lateral spines on fourth thoracic segment, no submedian carinæ on the thoracic and the five anterior abdominal segments, finally the dorsal ornamentation of the telson — by all these features together the species may be well characterized and easily recognisable.

5. *Squilla leptosquilla* Brooks.

1886. *Squilla leptosquilla* Brooks, Challenger Rep. Zool. XVI, Stomatop. p. 30, Pl. I, figs. 1—2.
1904. *Squilla leptosquilla* Jurich, Deutsche Tiefsee-Expedition, VII, 6, p. 370, Taf. XXV [I], Fig. 1—1*b*.
1913. *Squilla leptosquilla* Kemp, op. cit. p. 46.

Stat. 254. Dec. 10. Lat. 5°40′ S., long. 132°26′ E. 310 m. Fine, grey mud. Trawl. 1 female, 79 mm. long.

On the telson the submedian teeth of the hind margin are slightly longer than on Brooks' figure, but considerably shorter than on Jurich's two drawings. The intermediate teeth diverge a little backwards, and the lateral teeth are long, slender and diverging.

To the earlier descriptions may be added that the hand of third thoracic leg is only a little longer than broad, and as long as, but much broader than, the hand of fourth leg. No præepipod at the base of fourth leg.

Distribution. — This fine species has been taken from off the Andamans in 185 fms., 188—220 fms. and 370—419 fms. (Kemp), in the vicinity of the Nicobars, 296 m. (Jurich), and in the Celebes Sea near the Philippines, 115 fms. (Brooks). Consequently it must be considered as the most pronounced Stomatopod hitherto known inhabiting considerable depths.

6. *Squilla gonypetes* (Wood-Mason, MS.) Kemp.

1911. *Squilla gonypetes* Kemp, Rec. Ind. Mus. VI, p. 96.
1913. *Squilla gonypetes* Kemp, op. cit. p. 54, Pl. IV, figs. 42—44.

Stat. 51. April 19. Southern part of Molo-strait. 54—90 m. 2 specimens.

The largest specimen is a male and 45 mm. long. The hands of third and fourth pairs of thoracic legs nearly as in *S. leptosquilla*, and the præepipod is wanting at the base of fourth leg. The characteristic colouring is well developed.

Distribution. — This species is known from the Persian Gulf, various places in the Bay of Bengal, in the Mergui Archipelago, and the China Seas (see Kemp, p. 55).

7. *Squilla nepa* Latr.

1825. *Squilla nepa* Latreille, Encycl. Méthod. X, p. 471.
1913. *Squilla nepa* Kemp, op. cit. p. 60, Pl. IV, fig. 49.

Stat. 4. March 9. Lat. 7°42′ S., long. 114°12′.6 E. Anchorage off Djangkar (Java). 9 m. Coarse sand. Dredge. 1 adult specimen, 85 mm. long.

No præepipod at the base of fourth leg.

Distribution. — It is known with certainty from Karachi (the north-western point of India), in the Bay of Bengal, eastwards through the Indian Ocean and in the Chinese Seas to Hongkong. As to further particulars see KEMP p. 64.

8. *Squilla oratoria* De Haan.

1844. *Squilla oratoria* De Haan, in Siebold's Fauna Japonica, Crust. Atlas, Pl. LI, fig. 2.
1913. *Squilla oratoria* Kemp, op. cit. p. 66, Pl. V, figs. 54—56.

Stat. 51. April 19. Southern part of Molo-strait. 1 very small specimen.

The specimen which is only 18 mm. long, seems to belong to the present form.

Distribution. — According to KEMP (p. 67—70) this form is abundant in Chinese and Japanese waters; otherwise known with certainty only from the Hawaiian and Philippine Islands.

Squilla oratoria, var. *perpensa* Kemp.

1911. *Squilla oratoria*, var. *perpensa* Kemp, Rec. Ind. Mus. VI, p. 98.
1913. *Squilla oratoria*, var. *perpensa* Kemp, op. cit. p. 70, Pl. V, figs. 57—59.

Stat. 2. March 8. Lat. 7° 25′ S., long. 113° 16′ E. Madura-strait. 56 mm. Grey mud with some Radiolariæ. 1 rather small specimen without raptorial legs.
Stat. 47. April 8—12. Bay of Bima. 2 adult specimen, one among them marked Stat. 47, the other marked: Bima.
Stat. 64. May 4—5. Kambaragi-bay, Tanah Djampeah. 32 m. Coral, coralsand. 1 somewhat young specimen, without abdomen.
Stat. 313. Febr. 14—16. Anchorage East of Dangar Besar, Saleh-bay. 36 m. Sand, coral and mud. 1 specimen, without sixth abdominal segment and telson.
Stat. 323. Febr. 24—25. Sangkapura-roads, Bawean-island. 12 m. Mud. 1 adult specimen.

No præepipod at the base of fourth pairs of legs.

Distribution. — KEMP says p. 72: "The var. *perpensa* is distributed over an area extending from Hongkong and N. Australia to the Persian Gulf".

9. *Squilla interrupta* (Wood-Mason, MS.) Kemp.

1911. *Squilla interrupta* Kemp, Rec. Ind. Mus. VI, p. 98.
1913. *Squilla interrupta* Kemp, op. cit. p. 72, Pl. V, figs. 60—62.

Stat. 121. July 14—16. Menado-anchorage. Shore-exploration. 1 specimen, 72 mm. long.

The specimen agrees with KEMP's description and figures as to the eyes, in having two well developed tubercles on the carpus of the raptorial claw, etc., but it differs from *S. interrupta* and agrees more with var. *perpensa* Kemp in the fact that the proximal half of the outer margin of the longer spine of the ventral plate in the uropods is a little concave. Whether it can be considered a separate species or, as var. *perpensa*, only a variety of *S. oratoria*, may be considered again in the future.

Distribution. — KEMP says (p. 73): "This is one of the commonest species of *Squilla* in Indian waters", and on p. 74 he states that its range "extends from Formosa and Hongkong westwards to the Persian Gulf".

10. *Squilla Wood-Masoni* Kemp.

1911. *Squilla wood-masoni* Kemp, Rec. Ind. Mus. VI, p. 99.
1913. *Squilla wood-masoni* Kemp, op. cit. p. 74, Pl. V, figs. 63—65.

Stat. 4. March 9. Lat. 7° 42′ S., long. 114° 12′.6 E. Anchorage off Djangkar (Java). 9 m. Coarse sand. 1 female.

The single specimen is 55 mm. long. It agrees with KEMP's description in the following characters: the dorsal surface of the carapace and abdomen is smooth, highly polished and shining; the breadth of the carapace behind the antero-lateral angles is decidedly more than half as long as the carapace in the median line, rostrum included; the cornea of the eyes is very broad and very oblique on the stalk; the carpus of the raptorial claw has dorsally two well developed tubercles, and its "extreme distal edge is ... produced to a blunt tooth-like process"; the dactylus of the raptorial claw is strongly sinuate externally; the margin of the large ventral bifurcate process of the uropod has the proximal half of the outer margin of the longer spine somewhat concave. — But it differs from KEMP's description and figures of *S. Wood-Masoni* in some particulars: the anterior bifurcate portion of the median carina of the carapace is less obsolete, as its two rami, which are broadly rounded, are separated by a rather deep longitudinal impression; a median point on the anterior margin of the ophthalmic segment cannot be observed; the spines on the dactylus of the raptorial claw are conspicuously longer and less coarse than shown by KEMP in his fig. 64; the lateral processes on fourth to seventh thoracic segments, especially those on fourth segment, are longer than in *S. Wood-Masoni* and shaped as in *S. oratoria* var. *perpensa* (KEMP's fig. 57); the lobe on the outer margin of the longer spine of the ventral plate of the uropods is well developed, somewhat more produced and a little more narrow than in KEMP's fig. 59 of var. *perpensa*. — In these particulars the specimen agrees on the whole with var. *perpensa* and differs from the typical *S. Wood-Masoni* as characterized by KEMP; whether the last-named form can be maintained as a separate species or is to be considered a variety of *S. oratoria* the future may decide.

Distribution. — According to KEMP *S. Wood-Masoni* "extends over an area ranging from Hongkong and the Australian coast to the Persian Gulf, Aden and Zanzibar".

11. *Squilla indica* n. sp. Pl. I, figs. 4*a*—4*c*.

Stat. 115. July 9—11. East side of Pajunga Island, Kwandang-bay. 31 m. 1 male specimen, 22.5 mm. long.
Stat. 205. September 20. Lohio-bay, Buton-strait. 22 m. Sandy mud. 1 female, 33 mm. long.

Description. — The species is related to *S. oratoria* De Haan, but is instantly separated from it and from all other species of the same group in having the rostrum somewhat longer than broad and in possessing seven or eight spines, the terminal one included, on the dactylus of the raptorial claw.

The dorsal surface of the carapace and abdomen is not punctate but polished. The median carina of the carapace is sharp from behind to the origin of the bifurcation, but this part is completely obsolete, at most — in the large specimen — a small and feeble median impression is visible (fig. 4*a*). The breadth of the carapace behind the antero-lateral spiniferous angles is conspicuously less than half its median length, including the rostrum.

The rostrum (fig. 4 *a*) is somewhat longer than broad, oblong-triangular, with the distinctly upturned lateral margins converging to the rather narrow, rounded end; a faint vestige of a median keel on the anterior part is scarcely visible.

The cornea is, as in *S. oratoria* and allied forms, very oblique in proportion to the longitudinal axis of the stalk (fig. 4 *a*); the corneal index is about 3.8 in the large specimen. — The anterior margin of the ophthalmic segment has no median tubercle.

The outer inferior margin of the merus of the raptorial claw (fig. 4 *b*) is distally subangular or angular without any trace of spine. The dorsal carina of the carpus is low without the slightest trace of any tubercle; it terminates a little before the end of the joint, where it is curved downwards without any angle or spine. The dactylus has in the larger specimen (fig. 4 *b*) seven well developed, long, slender spines, the terminal spine included, in the smaller specimen eight well developed spines; in the large specimen the dactylus has posteriorly a little from the base a moderately conspicuous, rounded protuberance.

The hand of third leg is considerably longer than broad and somewhat broader but not longer than the hand of fourth leg. The præepipod at the base of the raptorial claw is large; at the base of second to fourth legs the præepipods are wanting, but whether that is due to the fact that both specimens seem to be young, I cannot decide.

The lateral processes on fourth thoracic segment differ materially in having the anterior branch extremely elongated, slender and so procurved that it is parallel with the longitudinal axis of the segment. The processes of fifth to seventh segments in the main as in *S. oratoria*.

The telson in the main as in *S. oratoria*. The median carina is well developed with a minute proximal notch; the rows of pits are discernible, though in the smaller specimen somewhat feebly developed. In the larger specimen the posterior margin has six pairs of submedian denticles, all acute except the most distal pair which is much larger than the others and broadly rounded; of intermediate denticles respectively eight and eleven are found, nearly all acute and the inner side of each intermediate tooth has besides a protuberance many times larger than a denticle and shaped as a rounded lobe. The smaller specimen has only in all seven submedian denticles and seven denticles in each intermediate excavation.

In the bifurcate process (fig. 4 *c*) from the peduncle of the uropods the lobe on the outer margin of the longer spine is in the larger specimen uncommonly large, considerably broader and longer than in *S. oratoria* var. *perpensa*, and the margin between that lobe and the bottom of the bifurcation is very concave; in the smaller specimen the lobe is somewhat smaller and the margin before it less concave.

The colour is not characteristic.

Remarks. — As already mentioned, *S. indica* is instantly separated from all species of the *oratoria*-group by the higher number of spines on the dactylus of the raptorial claw. Besides the extreme length and the direction of the anterior lateral process on fourth thoracic segment, the oblong shape of the rostrum and the completely obsolete bifurcation in front of the median carina of the carapace are good specific characters. The two specimens belong undoubtedly to the same species, but the possibility that they constitute a variety of one of the species of the *oratoria*-group seems to me to be excluded. Finally it may be noted that the copulatory tubes from seventh thoracic legs have seemingly arrived at full length, though

the animal is only 22 mm. long, but whether the specimen has arrived at full sexual maturity is yet perhaps a little doubtful.

12. *Squilla Schmeltzii* A. M.-Edw. Pl. I, figs. 5*a*—5*b*.

1873. *Squilla Schmeltzii* A. Milne-Edwards, Journ. Mus. Godeffroy, I, IV, p. 87, Pl. II, fig. 7.
1913. "*Leptosquilla schmeltzii*" Kemp, op. cit. p. 93, Pl. VII, figs. 81—83.

Stat. 47. April 8—12. Bay of Bima, near south fort. 13—31 m. 1 specimen.

The single specimen, a male, is 17 mm. long. It agrees on the whole with KEMP's figures in the raptorial claw with seven spines on the dactylus, in the extremely long eye-stalks with proportionately short and very oblique cornea, in antennulæ and antennæ, in the shape of the lateral processes of fourth thoracic segment, etc. But the lateral margins of the very long antennular segment (fig. 5*a*) converge nearly gradually from end to base and are consequently less convex in their proximal third. The rostrum is nearly as long as broad, thus differing from KEMP's fig. 81. The outline of the carapace agrees more with that in most species of the genus than shown by KEMP, as it is anteriorly only half as broad as long in the median line, but in front of the postero-lateral angles it is only a little less broad than its length, rostrum not included. It has no median carina, and its antero-lateral angles are spinous.

Præepipods are well developed at the base of first thoracic legs, but at least in the present specimen they are scarcely vestigial on second and third legs, and wanting on fourth pair.

The thoracic and the five anterior abdominal segments without submedian carinæ, while the three posterior thoracic segments have intermediate carinæ, and on the five anterior abdominal segments intermediate, lateral and marginal keels are well developed, but all without terminal spines. All six carinæ on sixth segment terminate in well developed spines (fig. 5*b*).

Of the marginal teeth of telson (fig. 5*b*) the submedian pair is a little longer and more narrow than on KEMP's fig. 83 and terminate in movable spines; the intermediate teeth are slightly longer than drawn by KEMP, while the lateral teeth are about as long as the intermediate pair, thus much more developed than shown by KEMP. The surface has the median keel well developed, with a terminal spine; a pair of rather small tubercles are observed somewhat in front of the outer part of the intermediate excavations. The lower surface is smooth, without median carina.

In the uropods (fig. 5*b*) the ventral plate from the peduncle has its proximal portion rather broad, with seven or eight spines on the inner margin; its inner terminal branch is very long, about three times as long as the outer moderately long and spiniform branch; besides the inner branch has its proximal two-thirds depressed as a rather narrow plate terminating in a small lobe. The first joint of the exopod has four movable spines; the most distal spine is rather expanded and more than twice as long as the small penultimate spine.

The surface of the animal has a very large number of brown or dark-brown dots, partly confluent at several places or forming a more or less regular figure on the central part of each of the segments not possessing submedian carinæ.

Remarks. — The specimen is probably not full-grown but yet it seems to have nearly or fully arrived at sexual maturity, as the copulatory tubes reach even a little beyond the base

of endopod and exopod of the seventh pair of legs. In spite of the minor differences pointed out between the 'Siboga' specimen and KEMP's figures of a still considerably smaller specimen it is evident that both belong to the same species. It is also certain that full-grown specimens of this form are still unknown, but judging from my experience I suppose that such specimens differ but little from the small specimen described, though it may be possible that quite full-grown specimens have somewhat more sculpture on the surface of the telson, and that some of the abdominal carinæ on the fifth and perhaps also on preceding abdominal segments terminate in spines. It is not surprising that full-grown specimens are unknown, as this species seems to be rare, and as the Indo-Pacific fauna of the genus *Squilla* is certainly a good deal richer than hitherto supposed.

13. *Squilla Sibogæ* n. sp. Pl. I, figs. 6*a*—6*e*.

Stat. 289. January 20. Lat. 9° 0'.3 S., long. 126° 24'.5 E. 112 m. Mud, sand and shells. Trawl. 1 male specimen, 47 mm. long.

Description. — This species differs widely from all other hitherto known members of the genus by the eyes and above all by its enormously elongated antennular segment.

The surface of the carapace is smooth and completely without carinæ, but with a pair of impressed points at the posterior end of the median line. The carapace (fig. 6*a*) looks rather aberrant, as about its anterior third is much narrower than in any other species, and anteriorly it is even less than one-third as broad as long in the median line, while its greatest breadth measured a little in front of the postero-lateral angles is about three-fourths of the median length. The gastric grooves are on nearly the anterior third of the carapace situated very near to its lateral margins; between these grooves the central half of the cervical groove is quite vanished. The antero-lateral angles are rounded.

The rostrum (fig. 6*b*) is nearly as long as broad; the lateral margins converge very feebly to beyond the middle, and the anterior margin is semicircular. The surface is a little convex without any median keel, but an impressed line is seen along and very near to each lateral margin.

The ophthalmic segment (fig. 6*b*) is short and bears a rather high dorsal, transverse and nearly lamellar crest, which at each side is produced in an oblong-triangular, acute, lamellar process, curved a little forwards and reaching a little beyond the outer margin of the eye-stalk.

The eyes (figs. 6*b* and 6*c*) are very characteristic. They are very compressed and the stalk is very short, while the cornea is about three times as long as the stalk, not at all bilobed but in the main almost circular when seen from the side, though its anterior margin has a very rounded angle; the cornea is about as deep as long.

The antennular segment (fig. 6*b*) is extremely elongated, conspicuously more than half as long as the carapace in the median line; its lateral margins are sub-parallel in about two-thirds of the length, and then they diverge considerably to the front end, but the antero-lateral angles are only feebly produced into a quite short, obtuse protuberance seen just outside the base of the antennulæ. The upper surface of the segment is longitudinally deeply excavated from the base to somewhat from the end, and in the bottom of this excavation a longitudinal median ridge is well developed.

The antennular peduncle (fig. 6*b*) is long, only a little shorter than the carapace. — In the antennæ the peduncle of the endopod reaches to the middle of the ophthalmic segment, and the squama to the end of that peduncle.

The mandibular palp is completely wanting.

In the raptorial claw (fig. 6*d*) all joints are uncommonly slender. The outer inferior margin of the merus is distally broadly rounded. The dorsal carina on the carpus is feebly developed and terminates a little before the end of the joint, which at that place has the dorsal margin a little incurved. The propodus has the usual three movable spines towards the base; the pectination vanishes completely towards the end of the margin, but close to end of that margin is seen a rather long and setiform spine, much recurved at the origin; it is visible on fig. 6*d* near the base of the dactylus. The dactylus has nine spines on the left and eight spines on the right leg, including the terminal spine; all spines are very slender and feebly curved.

First thoracic leg (the raptorial claw) has a large, and second leg a rather small præepipod, while such plates are wanting at the base of third and fourth legs. The hand of third leg is somewhat longer than broad and much broader than the hand of fourth leg.

The fourth thoracic segment (fig. 6*a*) is, seen from above, apparently on each side produced in a short triangle with the end rounded, but inspected mainly from in front it is instantly seen that the segment has a lateral, moderately long, vertical keel, the anterior side of which is a little excavated. The spiniform process on the lower side of the segment is very long and curved considerably forwards. — The three posterior thoracic segments without submedian carinæ, while the intermediate carinæ are well developed. On fifth and sixth segments the surface below these keels is hollowed, the outer margin very oblique, and the postero-lateral angles are produced as broad, acute, moderately short teeth; seventh segment laterally feebly produced without any protuberance or angle.

The five anterior abdominal segments considerably convex and without any trace of submedian carinæ; the intermediate, lateral and marginal carinæ well developed, but without terminal spines except the intermediate and the marginal carinæ on fifth segment and partly the marginal keel on fourth segment. A short, transverse, linear impression is found at the middle of second to fifth segment; besides all five segments have about six regularly distributed, impressed points on the median third of their surface. — Sixth segment (fig. 6*e*) with the submedian and intermediate carinæ well developed and terminating in short spines, while the lateral carinæ terminate in extremely long spines.

The telson (fig. 6*e*) is considerably convex with a very high median carina terminating in a spine and possessing a pronounced proximal notch. The intermediate carinæ well developed and rather oblique, without spines; a lateral keel is distinct near the outer margin. The whole surface without impressed points. The posterior margin has the submedian teeth somewhat slender and of very moderate length, each terminating in a movable spine; the submedian denticles are very slender and numerous, about eleven pairs, but difficult to count. The intermediate teeth are very long, reaching even slightly beyond the submedian pair, but of intermediate denticles only two pairs are found, one of which originates on a rather large and lobe-shaped protuberance. The lateral teeth are long, and the lateral excavation has a single denticle. The lower surface is smooth and a post-anal keel is completely wanting.

In the uropods (fig. 6*e*) the peduncle has the usual dorsal keel terminating in a spine; the ventral process tapers considerably from the base to the bifurcation, and the inner spine which is about twice as long as the outer, is only moderately long, without any lateral protuberance on the inner side; the inner margin of the process without serration or spines. First joint of the exopod with six movable spines, the two distal ones flattened and broad with the end obtuse; the terminal spine only moderately long and scarcely twice as long as the preceding one.

The colour of the single specimen is light, feebly mottled with brownish chromatophores; a dark spot is found posteriorly between the intermediate and the lateral carinæ on fifth abdominal segment; the median carina on the telson is black, and on the exopod of the uropods the end of first joint and a longitudinal spot on second joint are blackish.

Remarks. — As mentioned above, *S. Sibogæ* differs extremely from all other species not only of the genus *Squilla* but of all other genera by the extremely elongated antennular segment. But in various other features, as the extreme narrowness of the anterior part of the carapace, the shape of the eyes, the dorsal aspect of telson, the present form occupies an isolated position in the genus. I find it appropriate to apply the name of the great expedition to this magnificent species.

Pseudosquilla Dana.

Of this genus KEMP described nine species from the Indo-Pacific Region, but the 'Siboga' captured fully developed specimens of only a single species.

14. *Pseudosquilla ciliata* Fabr.

1787. *Squilla ciliata* J. C. Fabricius, Mantis. Insect. I, p. 333.
1880. *Pseudosquilla ciliata* Miers, Ann. Mag. Nat. Hist. 5. ser., V, p. 108, 458, Pl. III, figs. 7—8.
1913. *Pseudosquilla ciliata* Kemp, op. cit. p. 96.

Stat. 71. May 10—June 7. Makassar. 1 adult specimen.
Stat. 115. July 9—11. East side of Pajunga Isl., Kwandang-bay. Reef-exploration. 2 scarcely adult specimens.
Stat. 131. July 24—25. Anchorage off Beo, Karakelang-islands. Reef-exploration. 2 small specimens; without special locality: 1 half-grown specimen.
Stat. 133. July 25—27. Anchorage off Lirung, Salibabu-island. Reef-exploration. 1 adult and 3 half-grown specimens.
Stat. 172. August 27—28. Gisser; anchorage between this island and Ceram-Laut. Reef-exploration. 5 adult and 2 small specimens.
Stat. 193. September 13—14. Sanana-bay, East coast of Sula Besi. Reef-exploration. 1 adult specimen.
Stat. 204. September 20. Lat. 4° 20′ S., long. 122° 58′ E. Between islands of Wowoni and Buton; northern entrance of Buton-strait. 75—94 m. Sand with dead shells. Dredge and townet. 1 juvenile specimen in the "*monodactyla*"-stage.
Stat. 213. September 26—October 26. Saleyer-anchorage and Surroundings. Reef-exploration, 1 adult specimen. Besides 1 juvenile specimen in the "*monodactyla*"-stage.
Stat. 231. November 14—18. Ambon-anchorage. 1 large specimen.
Stat. 234. November 19—20. Nalahia-bay, Nusa-Laut-island. Reef-exploration. 5 specimens, 3 among them adult.
Stat. 240. November 22—December 1. Banda-anchorage. Reef-exploration. 2 adult specimens.

Stat. 258. December 12—16. Tual-anchorage, Kei-islands. 1 large specimen.
Stat. 303. February 2—5. Haingsisi, Samau-island. 36 m. Dredge. 1 small specimen.

As to the above-named "*monodactyla*"-stage the reader is referred to my report on the Stomatopoda secured by the German Plankton Expedition (1895) p. 85, where it is stated that *Pseudosquilla monodactyla* established by A. Milne-Edwards (1878) and accepted by Miers in his monograph quoted above is a not fully developed stage of *P. oculata* Brullé, but that a similar stage also occurs in *P. ciliata*.

Distribution. — *P. ciliata* has an extremely wide distribution in the tropical and warmer temperate seas. It occurs from the Red Sea, Mauritius and Zanzibar through the Indian waters to Japan and the Hawaiian Islands; furthermore it is known from Bermuda, Bahama Islands, and places at the southern coasts of United States and West Indies. (More special information in Kemp, p. 100).

Lysiosquilla Dana.

During my earlier study of the Squillidæ I observed in all species of *Lysiosquilla* seen by me in a number of European Museums that there is a very strong difference between the hand of third and that of fourth pair of thoracic legs. The hand of third leg is large, always distinctly, and in some forms considerably, broader than long, while its outer surface is at least almost three, sometimes four times larger than that of the unusually small-hand of fourth leg. By these characters not only the adult specimens of this genus are distinguished from those of all other genera (*Coronida* is in this respect intermediate between *Lysiosquilla* and *Squilla*) but the characters are of the highest importance in another respect, as they are also found in the oldest larval stages. By these characters it is f. inst. easy to separate old larvæ of a certain species of *Lysiosquilla* from larvæ of *Gonodactylus* taken in the same haul and very similar to each other as to the shape of the carapace and in general aspect.

Kemp mentions twelve species of *Lysiosquilla* from the Indo-Pacific region, but most of them are very rare. The 'Siboga' secured only a single well-known species.

15. *Lysiosquilla maculata* Fabr.

1793. *Squilla maculata* Fabricius, Ent. Syst. II, p. 511.
1880. *Lysiosquilla maculata* Miers, Ann. Mag. Nat. Hist. 5. ser., V, p. 125, 458, Pl. I, figs. 1—2.
1913. *Lysiosquilla maculata* Kemp, op. cit. p. 111, Pl. VIII, figs. 86—91.

Stat. 172. August 26—28. Gisser; anchorage between this island and Ceram-Laut. Reef-exploration. 1 specimen.
Stat. 234. November 19—20. Nalahia-bay, Nusa-Laut-island. Reef-exploration. 4 specimens, 3 among them extremely large.
Stat. 261. December 16—18. Elat, west coast of Great-Kei-island. Reef-exploration. 1 specimen.
Stat. 273. December 23—26. Anchorage off Pulu Jedan, East coast of Aru-islands (Pearl banks). 4 large specimens.
The largest specimen, a male from Nalahia-bay, measures 315 mm. in length.

Distribution. — Kemp writes (p. 115), that "it has a wide Indo-pacific distribution extending from Japan and Oceania to South Africa", and he enumerates a large number of special localities.

Coronidopsis n. gen.

It is deemed advisable to establish this new genus for the reception of a new species (founded on a single, probably adult specimen).

Carapace considerably narrowed anteriorly, without carinæ, except that about half of each lateral margin is conspicuously upturned; antero-lateral angles rounded; gastric grooves from the front to the origin of the cervical groove and feeble behind this groove; cervical groove wholly wanting between the two gastric grooves, and somewhat short outside each of these grooves. Rostrum anteriorly divided by a broad and rather deep incision into two long, acuminate and acute teeth. Mandibular palp well developed, three-jointed. Merus of the raptorial claw articulated terminally with ischium; ventral surface of merus longitudinally hollowed throughout its length; anterior margin of propodus pectinate in almost its whole length, and at the base with three movable spines; dactylus not inflated at the base, with three spines (excluding the terminal one) on the margin. Hand of third thoracic legs almost as broad as long, but not longer than the hand of fourth leg. Exopods of the three pairs of walking-legs flattened, two-jointed, those of first pair distally somewhat expanded. Three thoracic segments without carinæ, excepting a somewhat feebly developed intermediate keel on fifth segment. Four anterior abdominal segments without sculpture or carinæ, excepting that the lateral and antero-lateral margins are defined by conspicuous ridges; fifth segment with lateral longitudinal impression and keel, but no dorsal carinæ. Telson dorsally adorned with spines; intermediate and lateral teeth well developed, while instead of submedian teeth a somewhat small protuberance with a pair of movable spines. Ventral process from the peduncle of the uropods narrow.

Remarks. — This new genus is allied to *Squilla*, but shows some affinities to *Coronida*, especially in having no carinæ on the carapace and no vestige of a cervical groove between the gastric grooves. By the very curious form of rostrum it differs sharply from all other recent Stomatopoda hitherto known.

16. *Coronidopsis bicuspis* n. sp. Pl. I, figs. *7a*—*7g*.

Stat. 204. September 20. Lat. 4° 20′ S., long. 122° 58′ E. Between islands of Wowoni and Buton; northern entrance of Buton-strait. 75—94 m. Sand with dead shells. Dredge. 1 specimen (female).

Description. — The surface of the carapace (fig. *7a*) without trace of punctuation or carinæ, except that about half of each lateral margin is narrowly and distinctly upturned. The carapace is in the natural aspect about as broad as long in the median line, but it is in reality broader than shown in fig. *7a*, because in about the posterior half its lateral portions are curved downwards, especially its most postero-lateral part, the margin of which is rounded without any angle. The gastric grooves are strongly developed except a little from the front margin and behind the origin of the cervical groove, where each is only a fine line. Of the cervical groove only a somewhat short but deep and sharp depression exists almost as lateral outer branch from the gastric grooves, while more laterally and on the central area between the gastric grooves the cervical groove is totally vanished. The antero-lateral angles of the carapace are rounded. No trace of any organ can be observed posteriorly in the median line.

The rostrum (figs. 7*a* and 7*b*) is quite aberrant in shape. It projects anteriorly in two rather long, nearly spiniform, acuminate and acute processes widely separated by a large, wide, proximally semicircular excavation; the median part of the rostrum between its base and the excavation is longitudinally deeply hollowed, and the most lateral part of the rostrum is at each side curved downwards. The surface is smooth.

The eyes (figs. 7*a* and 7*b*) are, when seen from above and somewhat from the outer side, only a little longer than the breadth of the cornea, and they reach nearly to the middle of first antennular joint. The cornea is deeply bilobed and both halves are subequal in size, but it is placed very obliquely on the stalk, so that the outer lower half of cornea reaches almost as far forwards as its upper inner half. The stalk is somewhat short, obliquely much compressed, and increases much in breadth from the base to the cornea, which is somewhat broader than the stalk.

The antennular peduncle (fig. 7*a*) is about as long as the carapace (rostrum not included) in the median line. The antennal squama is rather narrow, not quite two-thirds as long as the carapace, and as long as the two distal joints combined of the peduncle of the endopod.

The mandibular palp is three-jointed.

The outer inferior margin of the merus of the raptorial claw is distally flatly rounded (fig. 7*c*). The dorsal carina of the carpus is sharp and terminates considerably before the end of the upper margin in an oblong and acute, spiniform tooth; externally the carpus is smooth. The propodus has proximally three movable spines, the first of which very long, and a row of pectinations along the margin opposed to the dactylus to near the base. The dactylus is proximally not inflated at the base, but has a conspicuous triangular protuberance and then a pronounced notch near the base; it has only three spines, all curved and proportionately very long, on the upper margin, while the distal half of the dactylus is spiniform and very curved.

The hand of third thoracic leg is almost as broad as long, but not longer than the oblong hand of fourth leg; præepipods are well developed at the base of second to fourth pairs of legs.

The fourth thoracic segment (fig. 7*a*) without lateral protuberances or any ventral process. The three posterior thoracic segments without carinæ, excepting that a rudimentary intermediate keel is visible anteriorly on fifth segment; outside that keel the surface is a little hollowed, and the lateral margin oblique and rounded. Sixth segment laterally nearly as the fifth, but without any trace of a keel; seventh segment laterally triangular, being somewhat produced outwards with the end subacute.

The abdominal segments are considerably depressed. The four anterior segments quite smooth excepting that their lateral and antero-lateral margins are defined by a fine linear impression, and that second, third and fourth segments have dorsally three impressed punctuations which especially on second segment are conspicuously transverse. Postero-lateral angles of the three anterior segments rounded, those on fourth segment a little spinous. Fifth segment (fig. 7*d*) as the fourth, excepting that the postero-lateral angles are somewhat rounded, that a rather deep longitudinal furrow is situated somewhat from the lateral margin, and a little more inwards on the surface a longitudinal narrow ridge is found which terminates in a spine. Sixth segment (fig. 7*d'*) has each postero-lateral angle strongly produced in a spine; at some distance from the

FISH & WILDLIFE
PACIFIC OCEANIC FISH
INVESTIGATIONS

lateral margin a deep longitudinal furrow with its outer margin carinated, and a little inside the posterior part of that furrow two spines — or, on the left side even three spines, the inner one very small — near each other a little in front of the posterior margin of the segment; besides a pair of small submedian spines are found on the posterior margin, but a pair of submedian carinæ in front of these spines are completely wanting.

The telson (fig. 7*d*) is short, twice as broad as long. The intermediate and the lateral teeth on the posterior margin are slender, spiniform and somewhat long; instead of the submedian teeth one finds a rather small, rounded median protuberance equipped with a pair of long movable spines; besides the posterior margin has four pairs of linear incisions, two between the median protuberance and an intermediate tooth, two between the intermediate tooth and the lateral one. The surface has a narrow and moderately low median carina without proximal notch but terminating in a spine, besides three pairs of not very conspicuous longitudinal impressions, the outer pair close to the raised lateral margin; the areas between the impressions are a little vaulted and adorned with a good number of conspicuous spines directed mainly backwards. At the base of telson in front of the inner and the outer pairs of a little vaulted areas two pairs of rounded tubercles are seen. The lower side of telson (fig. 7*e*) is richly adorned, possessing two pairs of large depressions along the posterior margin and in front of each depression or excavation a large spiniform process turning mainly backwards; the proximal half of each process is, when seen obliquely from the side (fig. 7*f*), strongly compressed and high. Before the middle of the lower surface and at a good distance from the median line a pair of oblique keels, each keel terminating posteriorly in a spine; the surrounding of the anus is much raised as an oval keel, and outside this a pair of small, oblong tubercles are observed. The central part of the surface from the anus to somewhat before the terminal protuberance is hollowed longitudinally.

The uropods (figs. 7*d* and 7*g*) are rather similar to those in some forms of *Squilla* with small eyes. The peduncle has its proximal portion very thick and a good-sized spine above the base of the exopod; its ventral plate is much narrowed from the base towards its bifid end and reaches very slightly beyond the endopod; the outer part at the bifurcation is produced into a small plate with a small spine, while the inner branch is a slender spine of moderate length; the plate has besides along the inner margin seven spiniform processes, which increase very much in length from the first to the seventh. In the exopod first joint is considerably shorter than the second, with eight movable spines on the outer margin; especially the three proximal spines very short and then the following spines increase gradually very much in length so that the eighth spine is long but rather slender and curved near the base. The same joint has on the lower side its end produced into a long, spiniform process with its distal part curved outwards, and most of this process is overlapped by the second joint, which is very long, moderately narrow and with a deep longitudinal furrow. The endopod is long, reaching almost to the end of the bifid plate, narrow and somewhat curved at the middle.

The colour of the single specimen is yellowish without darker spots. Length 43 mm.

Remarks. — This pretty animal with its telson richly adorned both above and below and its most curious rostrum is probably the most interesting form of the Squillidæ discovered during the last forty or fifty years.

Odontodactylus Bigelow.

Of this characteristic genus KEMP mentions nine species from the Indo-Pacific region and one from the Atlantic. But most of the Indo-Pacific species are scarce in collections, and in this paper I attempt to suppress four of the species adopted by KEMP, as two of these are founded on young stages and two others are probably only synonyms to a third form. The 'Siboga' captured two valid species.

17. *Odontodactylus scyllarus* L.

A. Adults.

1767. *Cancer Scyllarus* Linné, Syst. Nat. 12th ed. I, II, p. 1054.
1836—1849. *Gonodactylus scyllarus* H. Milne-Edwards, in CUVIER's Règne Animal, 3rd édit. Atlas, Pl. LV, fig. 2.
1913. *Odontodactylus scyllarus* Kemp, op. cit. p. 135.

Stat. 240. November 22—December 1. Banda-anchorage. Reef-exploration. 1 large specimen.
Stat. 261. December 16—18. Elat, West coast of Great-Kei-Island. Reef-exploration. 4 large specimens.

B. Young Stages: *O. elegans* Miers.

1884. *Gonodactylus elegans* Miers, Voy. H. M. S. 'Alert', p. 566, Pl. LII, fig. B, *b*.
1913. *Odontodactylus elegans* Kemp, op. cit. p. 139.

Stat. 240. November 22—December 1. Banda-anchorage. 1 specimen.

MIERS established his *G. elegans* on two specimens, the largest of which is only 23 mm. long. KEMP says (l. c.) that it "is almost certainly immature". Many years ago I examined MIERS' two specimens in the British Museum and arrived at the result that they are a young stage of the common *O. scyllarus*. I made then some notes, and from these I may quote the following statements. The small specimen is 20.7 mm., the other 23.2 mm. Both agree completely in all particulars. The rostrum is anteriorly deflexed. The position and shape of the two teeth on the margin of the dactylus of the raptorial claw is completely as in the adult *O. scyllarus*, but the dactylus itself is proximally scarcely as slender as drawn by MIERS. The postero-lateral angles of first and second abdominal segments rounded, on third segment angular, on fourth and fifth segments produced into a quite small spine. In both specimens there are eleven movable spines on first joint of each uropod. The denticles in the excavations of the posterior margin of the telson agree with those in a specimen measuring 112 mm. in length.

The single specimen of "*O. elegans*" secured by the 'Siboga' is 25 mm. long. The rostrum is much broader than long, subtriangular with the lateral margins a little convex, it is, especially anteriorly, distinctly a little hollowed longitudinally, anteriorly considerably deflexed, with the front angle somewhat rounded. The eyes are proportionally much larger than in adults, as the carapace (rostrum not included) is scarcely more than three times as long as the breadth of the cornea. The proximal two-fifths of the dactylus of the raptorial claw considerably less swollen than in the adult and with a distinct, rounded, rather low protuberance near the base; the shape and position of the two teeth on the margin completely as in the adult. The præepipods are well developed at the base of second to fourth thoracic legs. The postero-lateral angles of first

to fifth abdominal segment as in MIERS' specimen; on sixth segment the submedian and the lateral carinæ are short and terminate in spines, while there are only very feeble vestiges of intermediate carinæ. The telson has the median carina well developed and terminating in a short spine, but other carinæ on the surface are completely wanting; the denticles in the excavations between the well developed three pairs of teeth on the posterior margin nearly as in the adult. The antennal squama has a large, oblong, dark-brown patch; much of the endopod and of first joint of the exopod of the uropods is also dark-coloured.

Distribution. — KEMP writes, that this "species appears to have a wide Indo-Pacific distribution extending from Samoa and Japan to Madagascar".

It may perhaps be inserted here that POCOCK's type (in the British Museum Natural History) of his *Gonodactylus carinifer* Poc. is certainly a young stage of *Odontodactylus cultrifer* White. It has three teeth on the margin of the dactylus of the raptorial claw, but in Dresden I have examined an adult male, 92.5 mm. long, of *O. cultrifer* from Cebu with the same number of teeth, while only two teeth (the terminal one excepted) are found in most specimens. POCOCK had already suggested that his *G. carinifer* (1893) might be the young of *O. cultrifer*.

18. *Odontodactylus Hansenii* Poc.

1893. *Gonodactylus hansenii* Pocock, Ann. Mag. Nat. Hist. 6 ser. XI, p. 477, Pl. XX, B, figs. 3—3*b*.
1913. *Odontodactylus hanseni* Kemp, op. cit. p. 140.
1907. (?) *Odontodactylus latirostris* Borradaile, Trans. Linn. Soc. London, Zool. 2. ser. XII, p. 212, Pl. XXII, figs. 3—3*a*.
1913. (?) *Odontodactylus latirostris* Kemp, op. cit. p. 141.
1911. (?) *Odontodactylus southwelli* Kemp, Rec. Ind. Mus. VI, p. 94.
1913. (?) *Odontodactylus southwelli* Kemp, op. cit. p. 142, Pl. IX, figs. 103—106.

Stat. 99. June 28—30. Lat. 6° 7′.5 N., long. 120° 26′ E. At North-Ubian. Surface. 1 small specimen, 18 mm. long.
Stat. 154. August 14. Lat. 0° 7′.2 N., long. 130° 25′.5 E. 83—59 m. Grey muddy sand, shells and Lithothamnion. Dredge. 1 specimen, 62 mm. long.
Stat. 164. August 20. Lat. 1° 42′.5 S., long. 130° 47′.5 E. 32 m. Sand, small stones and shells. Dredge. 1 small specimen, 16 mm. long.
Stat. 240. November 22—December 1. Banda-anchorage. 6—36 m. Lithothamnion-bank. 1 specimen, 27 mm. long.
Stat. 313. February 14—16. Anchorage East of Dangar Besar, Saleh-bay. 36 m. Sand, coral and mud. 1 specimen, 32 mm. long.

The dactylus of the raptorial claw has eight marginal spines — the terminal spine excluded — in the specimens from Stat. 240 and Stat. 313; in the specimen from Stat. 154 the right dactylus has eight, the left only seven spines; in the specimen from Stat. 164 both dactyli have seven spines, but in the specimen from Stat. 99 only six marginal spines are found on each dactylus. In four specimens the most distal spine on first joint of the exopod of the uropods reaches almost to the end of second joint, but in the specimen from Stat. 313 that spine is a little shorter. (In the second part of this treatise post-larval stages shall be mentioned).

KEMP says that *O. latirostris* Borradaile is "perhaps not distinct from" *O. Hansenii* Poc., and I am inclined to think that BORRADAILE's form is only a synonym. But I suppose that *O. southwelli* Kemp is also the same species. KEMP writes (op. cit. p. 142) on his *O. southwelli*:

"This species is allied to the two preceding, but may be distinguished from them at a glance by the enormous size of the eyes". Unfortunately KEMP had not seen any specimen of *O. Hansenii* or *O. latirostris*, being only acquainted with the descriptions and figures published respectively by POCOCK and BORRADAILE. He refers all his seven specimens (from five Indian localities) to his *O. Southwelli*, and he says as to their eyes that "the breadth of the cornea being contained only from two to two and a quarter times in the median length of the carapace excluding the rostrum"; his specimens vary from 21 to 37 mm. in length. Now it may be observed that in the usual rather upturned position of the eyes their cornea does not show its greatest dimension, as stalk with cornea is somewhat compressed when seen vertically from above, but when the greatest dimension of the cornea shall be seen the eye-stalk is to be turned somewhat outwards and forwards. When that is made the breadth of the cornea in my 'Siboga' specimens varies from being contained from about two to two and two-thirds times in the median lenght of the carapace, and the eyes are proportionately smallest in the largest specimen, and largest in the smallest specimen. These facts make it probable that the chief difference between KEMP's *O. Southwelli* and the two forms established by POCOCK and BORRADAILE disappears. And it may be added that my specimens agree well with KEMP's figure of sixth abdominal segment with telson in his O. *Southwelli*. When two of the three names are considered as synonyms, this species must have the oldest name, *O. Hansenii* Pocock.

Distribution. — POCOCK's single specimen was from Macclesfield Bank, S. China Seas, 35 fathoms. BORRADAILE had two specimens from the Amirante Is. 25—30 fath. KEMP enumerates six specimens from localities at the Andamans (two among them from respectively 53 and 20 fath.) and one specimen from Ceylon. — The Copenhagen Museum possesses three specimens: from off Yolo, 25 fath. sand, coral (Dr. TH. MORTENSEN), from Amboina Bay, 50 fath. (Dr. TH. MORTENSEN) and from Hawaii (THAANUM).

Gonodactylus Latreille.

In 1913 KEMP mentions 26 species from the Indo-Pacific Region of this rich genus, but it is shown later on that I must consider one of these species (*G. demani* Hend.) as a variety of the common *G. chiragra*. In 1915 KEMP established a single new species, and in 1923 ODHNER described three new species, all from the Indo-Pacific Region. Consequently 29 species are now known from that region. The 'Siboga' collected 13 species, 3 of which are new to science. These 3 species are, in my opinion, all well founded and belong to different groups of forms in the genus.

19. *Gonodactylus chiragra* Fabr.

1781. *Squilla chiragra* J. C. Fabricius, Spec. Insect. I, p. 515.
1880. *Gonodactylus chiragra* Miers, Ann. Mag. Nat. Hist. 5. ser., V, p. 118 and 459.
1913. *Gonodactylus chiragra* Kemp, op. cit. p. 155, 150, Pl. IX, fig. 107.

Stat. 33. March 24—26. Bay of Pidjot, Lombok. 9—22 m. Mud, coral and coralsand. 1 specimen.
Stat. 34. March 27. Anchorage off Labuan Pandan, Lombok. 18 m.
Stat. 37. March 30—31. Sailus ketjil, Paternoster-islands. 1 specimen.
Stat. 40. April 2. Anchorage off Pulu Kawassang, Paternoster-islands. 12 m. Coralreef. 1 specimen.

Stat. 43. April 4—5. Anchorage off Pulu Sarassa, Postillon-islands. 36 and up to 30 m. 2 specimens.
Stat. 50. April 16—18. Bay of Badjo, West coast of Flores. 27—36 m., 2 specimens, and 40 m., 1 specimen.
Stat. 53. April 21/22. Bay of Nangamessi, Sumba. Up to 36 m. Coralsand. 3 specimens.
Stat. 58. April 25. Anchorage off Seba, Savu. Reef-exploration. 3 large specimens, one among them 97 mm. long.
Stat. 65[a]. May 6. Near Lat. 7° 0′ S., long. 120° 34′.5 E. 400—120 m. Dredge. 3 very small specimens (probably taking swimming).
Stat. 71. May 10—June 7. Makassar and surroundings. 8 specimens.
Stat. 78. June 10—11. Lumu-Lumu-shoal, Borneo-bank. Reef-exploration. 2 specimens.
Stat. 79[b]. June 12—13. Pulu-Kabala-dua, Borneo-bank. Reef-exploration. 1 specimen.
Stat. 81. June 14. Pulu Sebangkatan, Borneo-bank. Reef-exploration. 1 specimen, and 34 m.: 1 specimen.
Stat. 86. June 18—19. Anchorage off Dongala, Palos-bay, Celebes. 1 small specimen.
Stat. 91. June 22. Muaras-reef, inner side: East coast of Borneo. Up to 54 m. Hard coral. sand. 1 specimen.
Stat. 93. June 24—25. Pulu Sanguisiapo, Tawi-Tawi-islands, Sulu-archipelago. 5 specimens.
Stat. 96. June 27. South-east side of Pearl-bank, Sulu-archipelago. 15 m. Lithothamnion-bottom. Dredge; tow-net. 11 small specimens.
Stat. 99. June 28—30. Anchorage off North-Ubian. 16—23 m. Lithothamnion-bottom. 8 small specimens.
Stat. 109. July 5—6. Anchorage off Pulu Tongkil, Sulu-archipelago. 13 m. Lithothamnion-bottom. 1 specimen.
Stat. 115. July 9—11. East side of Pajunga Is., Kwandang-bay. Reef-exploration.
Stat. 125. July 18—19. Anchorage off Sawan, Siau-island. 31 m. Reef-exploration. 10 specimens, some among them very small.
Stat. 127. July 20—21. Taruna-bay, Great-Sangir-island. Reef-exploration. 1 specimen.
Stat. 129. July 22—23. Anchorage off Kawio- and Kamboling-islands, Karkaralong-group. 2 specimens.
Stat. 131. July 24—25. Anchorage off Beo, Karakelang-islands. Reef-exploration. 15 specimens.
Stat. 133. July 25—27. Anchorage off Lirung, Salibabu-island. 11 specimens, 3 among these from 36 m. Mud and hard sand; and at least 2 specimens from Reef-exploration.
Stat. 142. August 5—7. Anchorage off Laiwui, coast of Obi Major. Reef-exploration, 2 specimens.
Stat. 144. August 7—9. Anchorage north of Salomakiëe-(Damar-)island. 45 m. Coral bottom and Lithothamnion. 20 specimens, rather small to very small.
Stat. 149. August 10—11. Fau-anchorage and lagune. West coast of Gebé-island. Some few specimens.
Stat. 154. August 14. Lat. 0° 7′.2 N., long. 130° 25′.5 E. 83—59 m. Grey, muddy sand, shells and Lithothamnion. Dredge. 1 small specimen.
Stat. 174. August 28—29. Waru-bay, North coast of Ceram. Reef-exploration. 1 specimen.
Stat. 181. September 5—11. Ambon-anchorage. 2 specimens.
Stat. 193. September 13—14. Sanana-bay, East coast of Sula Besi. Reef-exploration. 17 specimens.
Stat. 194–197. September 15. Lat. 1° 53′.5 S., long. 126° 39′ E. — lat. 1° 45′.3 S., long. 127° 8′.3 E. Plankton. 1 small specimen.
Stat. 213. September 26—October 26. Saleyer-anchorage and Surroundings. Reef-exploration. 2 specimen.
Stat. 220. November 1—3. Anchorage off Pasir Pandjang, west coast of Binongka. Probably reef-exploration. 5 adult specimens.
Stat. 225. November 8. Anchorage south of Lucipara-group. Reef-exploration. 7 specimens of very different size.
Stat. 234. Nov. 19—20. Nalahia-bay, Nusa-Laut-island. Reef-exploration. 3 full-grown specimens.
Stat. 240. November 22—December 1. Banda-anchorage. Reef-exploration. 3 specimens; 1 specimen from 36 m., and 7 small specimens without depth, etc.

Stat. 250. December 6—7. Anchorage off Kilsuin, West-coast of Kur-island. 1 specimen from reef-exploration, and 3 small specimens from 27 m. Coral and Lithothamnion, Dredge.
Stat. 272. Dec. 21—23. Dobo, Aru-islands. Reef-exploration. 1 gigantic specimen, 102 mm. long.
Stat. 282. January 15—17. Anchorage between Nusa Besi and the N. E.-point of Timor. Reef-exploration. 2 large specimens, and 17 small specimens from 27—54 m. Sand, coral and Lithothamnion.
Stat. 285. January 18. Anchorage South coast of Timor. 34 m. Limit between mud and coral; Lithothamnion. Dredge. 1 small specimen.
Stat. 299. January 27—29. Buka- or Cyrus-bay, South-coast of Rotti-island. 5 specimens, 1 of which normal, 4 mentioned later on.
Stat. 310. February 12. Lat. 8° 30′ S., long. 119° 7′.5 E. 73 m. Sand with few pieces of dead coral. Dredge. 12 small or very small specimens.
Stat. 315. February 17—18. Anchorage East of Sailus Besar, Paternoster-islands. Depth up to 36 m. Coral and Lithothamnion. Dredge. 4 specimens, all mentioned later on.
Stat. 322. February 24. $1^1/_2$ mile south of Tandjong Lajar, South coast of Bawean-island. 32 m. Coral. Dredge. 1 very small specimen.

G. chiragra Fabr. var. *Demanii* Hend.

1893. *Gonodactylus Demanii* Henderson, Trans. Linn. Soc. London, Zool. 2. ser. V, p. 455, Pl. XL, figs. 23—24,
1913. *Gonodactylus demani* Kemp, op. cit. pp. 164 and 198, Pl. IX, figs. 108—111.

Stat. 58. April 25. Anchorage off Seba, Savu. Reef-exploration. 2 specimens.
Stat. 181. September 5—11. Ambon-anchorage. 2 specimens.

On Variation. — Kemp is of the opinion that *G. Demanii* Hend. is a separate species, not a variety of *G. chiragra*. In *Demani* the telson has usually a smaller or higher number of spinules; "apart from this feature *G. demani* bears a close resemblance to *G. chiragra*, from which, however, it may be separated by the shape of the dorsal processes of the ophthalmic somite and by the height and extreme convexity of the mid-dorsal lobe of the telson when seen in lateral view. The dorsal aspect of the telson presents, moreover, a very distinct and characteristic facies, for the three dorsal keels, and those which terminate in the submedian and intermediate marginal teeth, are all strongly swollen, and are separated from one another by narrow V-shaped grooves that form a striking contrast to the comparatively wide interspaces found practically without exception in *G. chiragra*". And in the special description of *G. demani* Kemp writes (p. 164) that the submedian marginal teeth "are evenly convex from side to side from the apex to the base and never bear a median keel distinct from the general surface as in *G. chiragra*". Finally Kemp writes on the American form (p. 152): "In Atlantic waters *G. chiragra* is represented by a form known as *G. oerstedi*, Hansen, which differs from its Pacific relative in the possession of a small additional keel on the inner face of the intermediate teeth of the telson edge. The character is so trivial that for many years it entirely escaped detection, but it seems nevertheless to prevail with the most absolute constancy". — After these quotations I may now mention the results of my experiences.

We may begin with *G. Oerstedii* Hansen. The single sharp difference between this American species and *G. chiragra* from the Indo-Pacific region is the existence in the first-named form of an additional carina on about the posterior half or one-third of the inner side

of the keel which runs forwards from each intermediate marginal tooth of the telson, while that additional keel is completely wanting even in the largest specimens of *G. chiragra*. In several European Museums I have looked over an enormous material: the additional carina is wanting in every specimen taken in the Red Sea, at the east coast of tropical Africa, in the Indian Ocean, at Japan and in Australia; the form is the real *G. chiragra*. But the carina in question is developed in every specimen excepting very young ones — 6 to about 12 mm. long — taken at numerous places in the West Atlantic from Bermudas to Fernando Noronha and common at many localities in West Indies; furthermore it is taken in the Pacific in the Gulf of California and in the Gulf of Panama; at two localities in the last-named area Dr. TH. MORTENSEN has secured many specimens. (It may be inserted here that in the Hof-Museum in Vienna) I noted — in 1890 — three normal specimens of *G. Oerstedii* without spines on the surface of the telson, and according to the label determined as *G. coronatus* Lockington by that author, but I do not believe that any species bearing that name has been described by LOCKINGTON.

Now we come to the variation of telson in *G. Oerstedii*. In most specimens the dorsal surface is smooth without spines or smaller protuberances. In a specimen measuring 34 mm. in length each keel on the submedian and the intermediate marginal teeth together with the additional carina and the end of the median keel has three, four or five small subconical dorsal protuberances; in another specimen the protuberances are more spiniform, and besides two spines are found posteriorly on each intermediate keel (in this specimen the lateral angles of rostrum are considerably more produced than usual, and the right one is even acuminated and acute); in a third specimen each fluke of the anchor (the outgrowths from the median dorsal carina) has also a couple of spines; in some specimens not only most protuberances are conical, acute spines, but they are also more numerous so that only about the proximal half of the surface of the three high keels is unarmed. It may be added that I have seen spiniferous specimens both from the Virgin Islands and from the Gulf of Panama. That all these specimens are only varieties of *G. Oerstedii* cannot be doubted; the spiniferous form has been established by NOBILI as a separate species (*G. festæ* Nobili, 1897). — But whether *G. Oerstedii* shall be considered a separate species or, as KEMP thinks, a sub-species or only an American race of *G. chiragra* is another question; in all cases it may be useful to preserve the name for this American form, which is very sharply defined by the additional carina mentioned above.

The topic on the spiniferous and the smooth specimens of *G. Oerstedii* is treated here for comparison with the question whether *G. Demanii* Hend., in which the surface of telson is usually adorned with spines, is a separate species or only a variety of *G. chiragra*, in which the telson is smooth. As already stated, KEMP considers it to be a separate species, but for various reasons, and among these the variation in *G. Oerstedii*, I am inclined to the opposite view. It may be useful to mention some specimens.

The character drawn by KEMP from the size and shape of the dorsal processes of the ophthalmic segment is of no value, as these processes vary very considerably in smaller (20 to 40 mm. long) specimens of *G. chiragra*. — In a specimen about 20 mm. long (gathered by Dr. TH. MORTENSEN at the Kei Islands) the median keel of the telson is somewhat narrow, and in the lateral view only moderately convex, but it has three triangular spines on the end

of the "flukes of the anchor", as the right fluke has two dorsal spines, the left one a single spine. In another specimen of the same size and from a not very distant locality the median carina, which is very broad and seen from the side very convex, has at the distal end three minute spines, while the submedian marginal teeth have sharp dorsal keels, and the inner margin of the endopod of the uropods is set with long hairs. — Among the 5 moderately small specimens from the 'Siboga' Stat. 299 one is a normal *G. chiragra*, the second is normal except that the rather narrow median keel of telson terminates in a sharp angle, the third has the median keel rather broad and from the side considerably convex, with a small spine on the end, but in other features the specimen is a normal *G. chiragra*; in the fourth specimen the median keel is very broad and in a lateral view very convex, but without spines; in the fifth specimen the median keel is extremely broad, very convex, with two small spines on the posterior surface, while each of the intermediate carinæ has a small spine a little before the end; in all five specimens the submedian marginal teeth have a dorsal keel, and the margins of the endopod of the uropods numerous hairs. From the 'Siboga' Stat. 315 4 specimens are to hand; 3 among them are small and normal *G. chiragra* except that the median carina of telson has a small tooth near the end; the fourth specimen, which is 33 mm. long, has the "flukes of the anchor" anomalously developed, very large, and both the median keel and each of the flukes has a long and slender spine; in other features the specimen is a normal *G. chiragra*.

Finally the four specimens from Stat. 50 and Stat 181 enumerated above as belonging to *Demanii* Hend.; they must be specially mentioned.

In all four specimens the inner margin of the endopod of the uropods is completely devoid of setæ, while the outer margin has a number of well developed setæ; in three of the specimens the antero-lateral angles of the rostrum are very acute, while they are a little rounded in the fourth specimen. One of the specimens is 21 mm. long, another is 17 mm., while the two others are intermediate. In all four specimens the median carina of the telson is very broad, seen from the side very or extremely convex and equipped with spines not only on the most posterior part of its surface, but besides with some spines along and rather near the posterior half or — in one specimen — the posterior third of its lateral margins. The submedian marginal teeth of the telson are not rounded above but adorned with a sharp keel, and about the anterior half of each tooth has three or, and more frequently, four large, acute spines. Each of the intermediate marginal teeth has two or three dorsal spines.

But now we come to a curious fact. In two specimens (one from each locality) each of the intermediate dorsal carinæ has a longitudinal impression, which consequently nearly divides each carina into two parallel keels, and in the largest specimen the external one of these secondary keels has a row of four spines, while in the other specimen it has only two or three spines. In the two other specimens the longitudinal impression on each intermediate carina is somewhat or considerably less developed but yet distinct, and one finds only posteriorly two or three spines either on both secondary keels together, or on the inner one.

Especially two of the four specimens differ thus materially from KEMP's description of his *demani* by the curious development of the intermediate keels on telson and constitute to some degree a transition towards *G. glabrous* Brooks, though it must be emphasized that the surface

of the telson in *G. glabrous* with its five dorsal carinæ shows always an aspect of its own. On the other hand it is seen that *G. Demanii* is not only very variable, but that it may be difficult to point out any really sharp character between it and *G. chiragra*. The above-mentioned variation of the American *G. Oerstedii* makes it also probable that all specimens from the Indo-Pacific Region described by KEMP as *G. chiragra* and *G. demani* belong to a single species. Each of KEMP's two forms is again subdivided into varieties, established by some authors as separate species.

Distribution. — *G. chiragra* is certainly the most common Stomatopod in the Indo-Pacific Region. For further particulars as to the hitherto known localities, where this species and its sub-species or varieties have been found, the reader is referred to several places on p. 161 to 167 in KEMP's work.

20. *Gonodactylus glabrous* Brooks.

1886. *Gonodactylus glabrous* Brooks, Voy. H. M. S. 'Challenger', Zool., XVI, p. 62, Pl. XIV, fig. 5; Pl. XV, figs. 7 and 9.
1913. *Gonodactylus glabrous* Kemp, op. cit. p. 167, Pl. IX, fig. 115.

Stat. 33. March 24—26. Bay of Pidjot, Lombok. Coralsand. 1 specimen.
Stat. 43. April 4—5. Anchorage off Pulu Sarassa, Postillon-islands. 36 m. Coral. 1 specimen.
Stat. 47. April 8—12. Bay of Bima; near south fort. Reef-exploration. 1 small specimen.
Stat. 50. April 16—18. Bay of Badjo, West coast of Flores. 27—36 m. 1 small specimen.
Stat. 53. April 21/22. Bay of Nangamessi, Sumba. Up to 36 m. Coralsand. 1 specimen.
Stat. 77. June 10. Lat. 3° 27′ S., long. 117° 36′ E. Borneo-bank. 59 m. Fine, grey coralsand. Dredge. 1 half-grown specimen.
Stat. 78. June 10—11. Lumu-Lumu-shoal, Borneo-bank. Shore-exploration. 11 specimens.
Stat. 79b. June 12—13. Pulu Kabala-dua, Borneo-bank. Reef-exploration. 1 specimen.
Stat. 93. June 24—25. Pulu Sanguisiapo, Tawi-Tawi-islands, Sulu-archipelago. Reef-exploration. 1 specimen.
Stat. 99. Juni 28—30. Anchorage off North-Ubian. 16—23 m. Lithothamnion-bottom. Dredge. 1 small specimen.
Stat. 144. August 7—9. Anchorage north of Salomakiëe-(Damar-)island. Reef-exploration. 3 adult specimens.
Stat. 172. September 26—28. Gisser; anchorage between this island and Ceram-Laut. Reef-exploration. 2 specimens.
Stat. 181. September 5—11. Ambon-anchorage. Reef-exploration. 1 specimen.
Stat. 213. September 26—October 26. Saleyer-anchorage and surroundings. Reef-exploration. 4 specimens.
Stat. 258. December 12—16. Tual-anchorage, Kei-islands. 3 specimens, one of which taken by the dredge in 22 m. Lithothamnion.
Stat. 261. December 16—18. Elat, West coast of Great-Kei-island. Reef-exploration. 1 specimen.
Stat. 273. December 23—26. Anchorage off Pulu Jedan, East coast of Aru-islands. (Pearl-banks). 1 specimen.
Stat. 299. January 27—29. Lat. 10° 52′.4 S., long. 123° 1′.1 E. Buka- or Cyrus-bay, South coast of Rotti-island. 4 specimens.
Stat. 303. February 2—5. Haingsisi, Samau-island. 1 specimen.
Stat. 304. February 6—8. Lamakera, Solor-island. Reef-exploration. 2 small specimens.
Stat. 315. February 17—18. Anchorage East of Sailus Besar, Paternoster-islands, 5 specimens.

The largest specimen has been taken with dredge at Stat. 258; it is 78 mm. long. — Two of the specimens from Stat. 299 have only a single tubercle behind the median carina of the telson.

Distribution. — KEMP (p. 109) enumerates numerous localities from Dar-es-Salaam and Zanzibar through the Indian Ocean and the Indo-Pacific to Liu-Kiu-Is. at Japan and N. E. Australia. STEUER has examined specimens in HELLER's collection taken at Lesina in the Adriatic; the determination is certainly correct, but I am inclined to suppose some error in the locality; and I hesitate to accept the statement until this species has been gathered at some place off Italy or the Balkan peninsula.

21. *Gonodactylus drepanophorus* De Man. Pl. II, fig. 1*a*.

1902. *Gonodactylus drepanophorus* De Man, Abhandl. Senck. Gesell. Frankfurt, XXV, p. 914; Pl. XXVII, fig. 68.
1913. *Gonodactylus drepanophorus* Kemp, op. cit. p. 175.

Stat. 285. January 18. Lat. 8° 39'.1 S., long. 127° 4'.4 E. Anchorage South coast of Timor. 34 m. On the limit between mud and coral. Lithothamnion. 1 specimen.

The single specimen is only 11.8 mm. long, thus certainly far from full-grown, but it is well developed; DE MAN's type, the only specimen hitherto known, was 18 mm. long. KEMP has compared DE MAN's long description with his own specimens of *G. Herdmanni* Tattersall, and between the two species he found only five differences which he enumerates. As to the second, third and fourth of these differences the 'Siboga' specimen agrees with *G. drepanophorus*, but as to the two other some remarks must be made, together with some other particulars.

Carapace, rostrum, eyes, raptorial claw and the five anterior abdominal segments as in *G. Herdmanni*. On sixth abdominal segment all six dorsal carinæ are somewhat narrow; the submedian pair rather high without terminal spines, while each of the lateral and of the somewhat high intermediate keels terminates in a spine. Telson which is much broader than high, is strongly armed with spines on the dorsal surface; the dorsal carinæ are well separated. The median carina is short, with five spines, viz. two pairs of somewhat small spines, while the terminal spine is conspicuously larger. Each intermediate carina has four strong spines, the distal one larger than the others and placed on the base of the submedian marginal tooth. Each lateral keel has three spines, the distal one placed on the base of the intermediate marginal tooth. The submedian marginal teeth are long and slender, with a good number of fine denticles on their inner margin. The intermediate marginal teeth are rather long; the lateral teeth are well-sized, triangular, acute, about as long as broad.

The uropod (fig. 1*a*) differs in some minor features from those in the type described by DE MAN and in *G. Herdmanni*. The ventral plate from the peduncle is very long, as its outer process reaches somewhat beyond the end of the exopod, and this process reaches only a little beyond the inner process. The first joint of the exopod projects far beyond the articulation with second joint and has above a conspicuous, a little crenulated keel; on the external margin it has ten or (on the right uropod) nine spines, most of which are distinctly recurved. Second joint of the exopod not oval as in most species of the genus but its inner margin is straight from a little from the base to the end and without setæ, while its outer margin is very convex to somewhat from the base and its distal half setiferous; the joint is somewhat less than twice as long as broad. The endopod somewhat resembles that in the type, but is more anomalous and differs considerably from that in *G. Herdmanni* as drawn by KEMP (fig. 114*a*). It is only

slightly more than twice as long as broad, and reaches scarcely to the end of the inner process of the peduncular plate; it is flattened, with the inner margin very curved, and the part along this margin is thicker and firmly chitinized, while the major portion of the joint is somewhat thin; the inner margin is abruptly and strongly bent at a considerable distance from the base, forming a protruding angle; somewhat from the end the same margin is bent suddenly in the opposite direction, so that the small most distal part of the plate-shaped endopod constitutes an oblong piece directed backwards and much inwards. The distal half of the outer margin of the endopod has a row of very long setæ, while half of the outer and the whole inner margin are naked.

Distribution. — The only specimen hitherto recorded was gathered at Ternate, one of the Molucca islands.

22. *Gonodactylus strigatus* n. sp. Pl. II, figs. 2*a*—2*b*.

Stat. 213. Zuid Island near Saleyer. 1 specimen.

Description. — The shape and size of the distal spines on the outer margin of first joint of the exopod of the uropods shows that this form is related to *G. brevisquamatus* Paulson, *G. fimbriatus* Lenz and *G. spinoso-carinatus* Fukuda; it is most allied to the last-named Japanese form but differs in several features as to the telson and the uropods. The single specimen measures only 10 mm. in length, and is therefore scarcely adult, but it seems to possess its final aspect.

The animal is uncommonly slender.

The carapace is conspicuously longer than broad and only a little narrower in front than behind. The anterior margins on either side of the rostrum (fig. 2*a*) slope forwards, and the rounded antero-lateral angles are much in advance of the rostral base. The rostrum has a long and slender median spine which reaches conspicuously beyond the middle of the eye-stalks; the lateral spines are feebly produced, very broad, acute; the undivided basal part is broad and short.

The dorsal processes of the ophthalmic segment are nearly rudimentary. The eyes reach even somewhat beyond the end of third antennular joint; they are a little compressed, seen from above broadest a little from the base of the stalks, and taper gradually a little in breadth to near the rounded end of cornea; the cornea is slightly oblique on the stalk.

The antennal squama is small and reaches only a little beyond the penultimate joint of the peduncle of the endopod.

The basal part of dactylus of the raptorial claw is strongly swollen, with a conspicuous notch at the usual place; the distal part is slender and considerably curved.

The posterior thoracic segments show nothing of interest. The five anterior abdominal segments are smooth, excepting that there is a well-defined ridge on either side defining the lateral and antero-lateral margins; the postero-lateral angles of all five segments are rounded.

The sixth abdominal segment (fig. 2*b*) is longer in proportion to telson than in most species of the genus. It has a median longitudinal depression from the posterior margin to the middle of the segment, and two pairs of more lateral depressions; in this way the two normal submedian bosses are completely confluent on the anterior half of the segment, while the

intermediate bosses are moderately developed, and the lateral pair nearly forming rounded keels. There are no spines on the posterior margin of the segment.

The telson (fig. 2*b*) is movably articulated to the preceding segment and very characteristic. It has posteriorly a large excavation which is a little broader than deep; each submedian tooth is very large, with a small terminal movable spine and many denticles on the inner margin. Each lateral margin of the telson constitutes a nearly unbroken and somewhat convex line from the base to the end of the submedian tooth, as it possesses only a minute rudiment, with a small spine, of an intermediate tooth, while every trace of a lateral tooth has disappeared. Nearly the entire surface of the telson excepting the area on each submedian tooth is adorned with nine longitudinal carinæ, the marginal keels included. The median keel is very broad in front and tapers nearly gradually from near its origin to its posterior end, being still moderately broad a little in advance of the median excavation. It is impossible to discover any spinules on any of the carinæ.

The uropods (fig. 2*b*) are very peculiar. The peduncle has a long outer margin before the base of the exopod; the usual ventral plate is proximally very broad, with the terminal outer process broad, long, acute, a little curved, and almost four times as long as the inner slender tooth. The peduncle has a spine above the insertion of the exopod, and a little more proximally a minute knot, but no spines on the surface. First joint of the exopod is scarcely as long as the outer margin of the peduncle; it has on the proximal half of its outer margin three spines increasing much in length from the first one, which is minute, to the third which is moderately long, strong and slender. Beyond that third spine the joint is distinctly somewhat expanded and has on the outer and on the terminal margin three recurved spines; the first long, very recurved and extremely broad, while the second is shorter, less recurved and much less broad, but considerably larger than the third which is terminal. The second joint which is inserted on the surface of the first a little beyond its middle, reaches slightly beyond the terminal spine of that first joint, is a little more than twice as long as broad with the major part of its outer margin somewhat convex. The endopod is a small, very oblong joint distinctly longer than second joint of the exopod; it reaches only a little beyond the end of the inner tooth of the above-named plate.

The specimen is dark brown and partly almost black.

Remarks. — As already remarked, *G. strigatus* is allied to *G. spinoso-carinatus* Fukuda (1910), a Japanese species of which only two specimens are known. But judging from Fukuda's moderately good figures his specimens differ more from *G. strigatus* as to telson and uropods than one might suppose according to his description. The posterior excavation of the telson is more narrow in Fukuda's species than in *G. strigatus*. He says that the surface of the telson has nine longitudinal carinæ, but his fig. 2*a* shows decidedly eleven carinæ, as more than the posterior half of the median keel is rather narrow and has on either side a longitudinal keel not counted as such by Fukuda in his text; furthermore the shape of the median carina on his figure differs widely from that in *G. strigatus*, and this species exhibits no trace of the submedian keels figured by him; finally no keel in *G. strigatus* has any vestige of the prickles or minute spines mentioned by Fukuda. In the uropods the surface of the peduncle has in the Japanese species "three or four spines besides the terminal one", while in *G. strigatus* only

a minute knot is found in front of the terminal spine. Second joint of the exopod is in the Japanese form articulated much longer from the end of first joint than in *G. strigatus*, and besides it is conspicuously longer in proportion to its breadth. The endopod is very much shorter in *G. strigatus* than in the Japanese species. — The great difference as to the length and shape of the endopod and of second joint of the exopod of the uropods between the two species, together with the existence in *G. spinoso-carinatus* of a pair of additional submedian keels on the telson which are completely wanting in *G. strigatus*, these differences are so important that both forms must, in my opinion, be considered as valid species.

23. *Gonodactylus furcicaudatus* Miers.

1880. *Gonodactylus furcicaudatus* Miers, Ann. Mag. Nat. Hist. 5. ser. V, p. 124; Pl. III, figs. 13—16.
1913. *Gonodactylus furcicaudatus* Kemp, op. cit., p. 176.

Stat. 225c. November 8—10. Anchorage south of Lucipara-group. Reef-exploration. 4 specimens.

The largest specimen of this very curious species is 27.5 mm. long.

Distribution. — The locality of Miers' type specimens is unknown. Nobili records a specimen from Matakea, N. E. of Tahiti.

24. *Gonodactylus pulchellus* Miers.

1880. *Gonodactylus trispinosus* var. *pulchellus* Miers, Ann. Mag. Nat. Hist. 5 ser., V, p. 122.
1913. *Gonodactylus pulchellus* Kemp, op. cit. p. 177, Pl. X, figs. 117 and 118.

Stat. 58. April 25. Anchorage off Seba, Savu. Reef-exploration. 1 specimen.
Stat. 258. December 12—16. Tual-anchorage, Kei-islands. 3 specimens.

The best characters between this species and *G. nefandus* Kemp are the shape of the rostrum and the plate of the ophthalmic segment, together with the size of the eyes.

Distribution. — This species has been recorded from Aden, Dar-es-Salaam, Portuguese E. Africa, the Persian Gulf and Ceylon (Kemp p. 279).

25. *Gonodactylus nefandus* Kemp.

1911. *Gonodactylus nefandus* Kemp, Rec. Ind. Mus. VI, p. 93.
1913. *Gonodactylus nefandus* Kemp, op. cit. p. 179; Pl. X, figs. 119 and 120.

Stat. 50. April 16—18. Bay of Badjo, West coast of Flores. 27—36 m. 1 specimen.
Stat. 104. July 2—3. Sulu. Anterior half of a large specimen.
Stat. 204. September 20. Lat. 4° 20′ S., long. 122° 58′ E. Between islands of Wowoni and Buton. From 75 to 94 m. Dredge. 1 rather large specimen.
Stat. 240. November 22—December 1. Banda-anchorage. 1 specimen.
Stat. 279. January 11—13. Rumah-Kuda-bay, Roma-island. 36 m. Dredge. 1 somewhat small specimen.
Stat. 313. February 14—16. Anchorage East of Dangar Besar, Saleh bay. 36 m. Sand, coral and mud. 1 rather large specimen.

The specimen from Stat. 204 has a number of impressed points on the dorsal part of fifth abdominal segment, while such points are not found in any other specimen.

Distribution. — Kemp's specimens had been gathered at the Andamans, at Cheduba, Arakan coast, and in the southern portion of Malacca Straits.

26. *Gonodactylus pulcher* n. sp. Pl. II, figs. 3*a*—3*b*.

Stat. 78. June 10—11. Lumu-Lumu-shoal, Borneo-bank. 34 m. Coral and coralsand. Shore-exploration. 1 specimen.

Description. — The single pretty specimen is 22 mm. long. The species is more allied to *G. pulchellus* Miers and *G. nefandus* Kemp than to any other member of the rich genus, but it is instantly recognized by the peculiar adornment of the surface of telson.

The carapace is a little longer than broad, with the posterior margin slightly concave. The anterior margin on either side of the rostrum is more concave, but though the antero-lateral angles are a little produced, these angles are not in advance of the rostral base. The rostrum (fig. 3*a*) is trispinous, and the acute lateral spines are considerably stouter and shorter than the slender median spine; the undivided basal part of the rostrum is short, as its length is conspicuously less than half as that of the median spine.

The dorsal processes of the ophthalmic segment are easily observed in front of the rostral plate; each process is large, seen from above shaped as half of a cup, consequently considerably vaulted, and its front margin is a straight, a little oblique line terminating very near the proximal outer angle of the eye-stalk. The eye-stalks are a little thicker at the base than towards the cornea, which is rather oblique, slightly broader than the stalk and reaches to the end of the second antennular joint.

The basal part of the dactylus of the raptorial claw is strongly swollen with a moderate notch below, as a small inflexion of its margin indicates a rudimentary "heel"; the distal portion is slender and somewhat curved.

The lateral margins of fifth and sixth thoracic segments are broadly rounded, while the margin of the seventh segment is laterally produced in a distally rounded protuberance.

The median portion of the five anterior abdominal segments is entirely smooth, but in some of the segments four minute pits can be discerned. In all five segments there is a well-defined lateral ridge on either side defining the lateral and the antero-lateral margins; the third and specially the fourth segment has higher upwards on each side a very oblique and rather sinuate, somewhat **S**-shaped, rounded ridge, while this ridge is nearly obsolete on second segment. The fifth segment (fig. 3*b*) has on either side two rather deep longitudinal depressions or furrows, and above them a third much more feebly developed depression; its median area is smooth. The postero-lateral angles of third to fifth segment are subacute but not spinous.

The sixth abdominal segment (fig. 3*b*) is only a little movable against the telson, and seen from above both the anterior and the posterior margin is concave, so that the segment is only about half as long at the middle as near the lateral margins. It has a submedian pair of rounded, very convex bosses, each a little longer than broad; at each side a marginal boss or thick ridge is very developed and produced as an obtuse protuberance above the antero-lateral angles of the telson. Between the marginal and the submedian bosses the area has some depressions or wrinkles and rounded, irregular ridges very different in size and direction.

The telson (fig. 3*b*) is conspicuously broader than long, subquadrangular, with the lateral margins almost straight to near their incurved end; the posterior margin is, taken as a whole, somewhat convex, but divided by incisions into eight lobes, the outer pair short. The

surface taken as a whole is conspicuously excavated with a rather high and large, dorsally rounded protuberance at the base, and this protuberance, except its central part, has some feeble, irregular furrows. The telson is cleft in the median line nearly from that boss to the end. The lateral margins are very high and thick. Instead of the two submedian elevations found f. inst. in *G. pulchellus* each of the places in question shows two or rather three longitudinal and rounded ridges. Between the outer one of these ridges and the major part of the marginal ridge the surface has about six very oblique, parallel, rounded keels. A submedian furrow runs parallel with the long median incision, and the interstices between these furrows and the median incision are slightly raised as low, rounded keels; otherwise nearly the posterior third of the surface of telson is smooth. The four pairs of lobes or protuberances on the posterior margin are rounded, and each has a more or less distinct minute denticle on the inner side; the most lateral pair of these protuberances are less developed than the three other pairs, but besides these is at the median incision an additional, quite short protuberance, because the end of the dorsal submedian keel just described is slightly protruding and possesses some quite rudimentary denticles (impossible to render on fig. 3*b*).

The ventral plate from the peduncle of the uropods (fig. 3*b*) terminates in two acute teeth, the outer considerably more than twice as long as the inner. First joint of the exopod with nine movable spines of normal size and shape; second joint with setæ (not drawn on fig. 3*b*) on both margins, and the same is the case in the normal, oblong-oval endopod.

Remarks. — This species differs in most particulars only a little or not at all from *P. pulchellus* Miers as described and figured by KEMP, but the surface of the telson differs strongly from that in the last-named form and in all other species. Other differences are found in the dorsal processes of the ophthalmic segment and in the sixth abdominal segment.

27. *Gonodactylus trispinosus* Dana.

1852. *Gonodactylus trispinosus* Dana, U. S. Explor. Exped. Crust., p. 623.
1880. *Gonodactylus trispinosus* Miers, Ann. Mag. Nat. Hist. 5 ser. V, p. 121; Pl. III, fig. 10 (partim).
1913. *Gonodactylus trispinosus* Kemp, op. cit. p. 180.

Stat. 299. January 27—29. Lat. 10° 52′.4 S., long. 123° 1′.1 E. Buka- or Cyrus-bay, South coast of Rotti-island. 2 specimens.

The largest specimen is 23 mm. Both specimens agree completely with KEMP's remarks in three characters: the lateral angles of the rostrum are produced into rather long, spiniform, acute processes; the three bosses on the telson are densely clothed with fine, short hairs; behind the bosses the surface of telson is adorned with a good number of more or less parallel, impressed lines. But the specimens differ from KEMP's notes in two minor particulars, viz. the antero-lateral angles of the carapace are nearly subacute and measure 80° to near 90°; finally the median part of fifth abdominal segment has a pair of submedian longitudinal impressions on less than the posterior half of the surface near the median line, and in the large specimen besides a pair of subsimilar longitudinal impressions a little outside the first-named pair.

Distribution. — This species has according to KEMP been recorded from W. and N. W. Australia, Auckland Is., Fiji Is. and Loyalty Is. As to doubtful localities see KEMP p. 181.

28. *Gonodactylus glyptocercus* Wood-Mason.

1875. *Gonodactylus glyptocercus* Wood-Mason, Proc. Asiat. Soc. Bengal p. 232.
1886. *Protosquilla cerebralis* Brooks, Voy. H. M. S. 'Challenger', Zool. XVI, p. 72, Pl. XIV, figs. 2 and 3; Pl. XVI, figs. 2 and 3.
1913. *Gonodactylus glyptocercus* Kemp, op. cit. p. 186.

Stat. 125. July 18—19. Anchorage off Sawan, Siau-island. Reef-exploration, 3 specimens, and 2 specimens without special information, perhaps taken in dredge, 27 m.
Stat. 133. July 25—27. Anchorage off Lirung, Salibabu-island. Reef-exploration. 1 well-sized specimen.

The largest specimen is 35 mm., thus somewhat longer than Kemp's specimens. It was taken at Stat. 125, Reef.

Distribution. — This beautiful form has been recorded from a considerable number of places in the Indo-Pacific (see Kemp p. 187).

29. *Gonodactylus excavatus* Miers. Pl. II, fig. 4*a*.

1880. *Gonodactylus excavatus* Miers, Ann. Mag. Nat. Hist. 5. ser. V, p. 123; Pl. III, figs. 11 and 12.
1913. *Gonodactylus excavatus* Kemp, op. cit. p. 187; Pl. X, figs. 122 and 123.

Stat. 133. July 25—27. Anchorage off Lirung, Salibabu-island. Depth up to 36 m. Mud and hard sand. 1 specimen.
Stat. 282. January 15—17. Lat. 8° 25′.2 S., long. 127° 18′.4 E. Anchorage between Nusa Besi and the N. E.-point of Timor. 27—54 m. Sand, coral and Lithothamnion. 1 specimen.
Stat. 299. January 27—29. Lat. 10° 52′.4 S., long. 123° 1′.1 E. Buka- or Cyrus-bay, South coast of Rotti-island. 34 m. Mud, coral and Lithothamnion. 1 specimen.

The three specimens are all small, 13—15 mm. long, and may be considered a kind of variety of *G. excavatus* as described and figured by Kemp. The specimens differ a little from each other and from Kemp's description in various minute features, but they agree in the main with each other in the lobes on the posterior margin of the telson, and differ in this respect more conspicuously from Kemp's fig. 123 and his description. The two pairs of lobes on that margin (fig. 4*a*) are much larger, much more produced than figured by Kemp; those of the outer pair are much broader than the inner lobes, and in one specimen even each inner lobe has a pronounced dorsal longitudinal keel, but a sketch drawn by me many years ago from the telson of Miers' type specimen in London agrees as to the two pairs of lobes much better with the 'Siboga' specimens than with Kemp's fig. 123. Consequently I consider the 'Siboga' specimens (one of which later lost by a mishap) as belonging to *G. excavatus*, showing only some variation.

Distribution. — *G. excavatus* was only known from places at the Andamans, and from Macclesfield Bank, China Seas (Kemp, p. 189).

30. *Gonodactylus trigibbosus* n. sp. Pl. II, figs. 5*a*—5*b*.

Stat. 213. September 26—October 26. Saleyer-anchorage and Surroundings. Reef-exploration. 1 specimen.

Description. — This species is allied to the Atlantic *G. Folinii* A. Milne-Edwards,

but is instantly distinguished by the telson which has all three pairs of marginal teeth acute, and it is distinctly movable against the sixth abdominal segment. The single specimen is 14.5 mm.

The carapace is distinctly broader than long in the median line, and considerably wider behind than in front. On either side of the rostrum the anterior margin is nearly straight, with the anterior angle rounded (fig. 5 *a*) and situated at least not in advance of the rostral base. The rostrum has its median spine moderately long and robust; the lateral teeth are short but very broad with the tip subacute; the undivided basal part of the rostrum is moderately long.

The dorsal processes of the ophthalmic segments are rudimentary. The eyes reach to the end of second antennular joint; both cornea and stalk are laterally compressed, seen from above broadest at the base of cornea.

The basal part of the dactylus of the raptorial claw is only moderately swollen with a distinct notch below; the distal portion is slender and a little curved.

The lateral margins of fifth and sixth thoracic segments are broadly rounded, while the seventh segment is laterally a little produced as a short and rounded protuberance.

The median portion of the five anterior abdominal segments is smooth, but the second segment has a rather long transverse furrow between a pair of transverse pits; third to fifth segment each with a tranverse median pit and a pair of more lateral, round pits. All five segments have a fine ridge defining the lateral margin; fourth segment has a shallow, and fifth a well developed, longitudinal impression somewhat above each lateral margin; fifth segment has besides two or three rather small and irregular impressions somewhat above the longitudinal impression. The postero-lateral angles of second to fourth segment are nearly or completely acute but not spinous, while those of fifth segment are produced as short spines.

The sixth abdominal segment (fig. 5 *b*) is a little longer at the sides than at the middle, with six rather oblong and considerably vaulted bosses, those of the submedian pair rather removed from one another, and the bosses of the intermediate pair somewhat irregularly shaped. While the central part of the bosses is smooth, their more lateral parts have a number of minute prickles and minute hairs.

The telson (fig. 5 *b*) is slightly broader than long and somewhat depressed. The posterior marginal excavation is broad but only moderately deep; the submedian marginal teeth are large, triangular, considerably broader than long, and the acute end has a small movable spine, while the inner margin of each tooth has a good number of fine, slender denticles. The intermediate teeth are well developed, considerably broader than long, acute, and a couple of denticles are seen in the excavation between the intermediate and the submedian teeth. The lateral teeth are somewhat small but very conspicuous, triangular and acute. The surface has three large longitudinal bosses; the median boss is very oblong-ovate or perhaps oblong-triangular with well rounded angles; it begins rather near the base of telson and terminates somewhat before the bottom of the marginal median excavation. The intermediate bosses are rather thick though considerably more narrow than the median boss; they reach posteriorly to near the base of the large submedian teeth; anteriorly they may be said to reach almost to the base of telson, but the most proximal portion of each boss is marked off as a rounded, somewhat obliquely-transverse and high knot by a transverse depression. The lateral margin has a raised, conspicuous keel reaching the lateral tooth, and between that keel and the intermediate boss the surface shows

a feebly developed submarginal keel. The bosses and keels have a number of minute prickles with very short hairs.

The urópods (fig. 5 *b*) are normal. The plate from the peduncle is long and terminates in two acute teeth; the outer one is rather broad, reaches to the end of the exopod and is more than twice as long as the inner tooth. First joint of the exopod is long, has a dorsal carina and on the external margin eight or nine movable, a little curved or straight spines increasing very moderately in length from the first to the last, the latter being conspicuously shorter than the small, regularly shaped second joint which is setose (the setæ omitted on fig. 5 *b*). The endopod is normal, very oblong, with setæ along both margins.

Remarks. — In the Report on the Stomatopoda of the Plankton-Expedition (1895) I have drawn (on Taf. VIII) sixth abdominal segment with telson of a specimen 18.8 mm. long of the Atlantic *Gonodactylus Folinii* A. Milne-Edw., and besides the same parts of a young specimen, 8.3 mm. long, which is a stage intermediate between the larva and the adult. In comparing these two figures with the present fig. 5 *b* of *G. trigibbosus* one might suppose that the single 'Siboga' specimen belongs to *G. Folinii* because it shows a kind of stage intermediate between the figures of the Atlantic specimens. But the telson is comparatively broader in the 'Siboga' specimen than in the Atlantic specimens, and the fact that the intermediate bosses have their proximal part marked off as separate protuberances is undoubtedly a valid specific character. Yet it may be stated that I am unable to decide with absolute certainty whether the 'Siboga' specimen is fully developed, though judging from its comparatively considerable size and the aspect of the telson it seems to have acquired its final shape. And if so the movability of the telson against the sixth abdominal segment and the shape of the six marginal teeth with their acute ends are excellent specific differences between this species and the Atlantic *G. Folinii*.

31. *Gonodactylus spinosissimus* Pfeffer.

1888. *Gonodactylus spinosissimus* Pfeffer, Mitth. Naturh. Mus. Hamburg, VI, 4, p. 35.
Gonodactylus spinosissimus Kemp, op. cit. p. 191; Pl. X, figs. 124 and 125.

Stat. 66. May 7—8. Bank between islands of Bahuluwang and Tambolungan, south of Saleyer. 8—10 m. Dead coral, Halimeda; Lithothamnion. Dredge. 1 specimen.

The specimen is 19 mm. long. The median spine of the rostrum is still somewhat longer than stated by Kemp, as it reaches distinctly beyond the middle of the inner margin of the cornea. Fourth abdominal segment has a distinct submarginal keel and above it an anteriorly curved, very distinct ridge. Fifth segment has not only the longitudinal lateral furrows and carinæ mentioned by Kemp, but on a little less than the posterior half of the dorsal surface one median and a pair of submedian rather deep and very conspicuous impressions, each somewhat longer than broad.

In the other structural features the specimen agrees with Kemp's fine figures and his description.

Distribution. — This peculiar species has been recorded from the Red Sea, from Zanzibar, and from localities near Ceylon (see Kemp p. 192).

II. Larval and very young post-larval Stages.

Giesbrecht states in his great work on the Stomatopoda of the Mediterranean (1910) that in the larvæ of the genus *Squilla* which are known as *Alima*, the telson has four or more denticles between the submedian and the intermediate marginal teeth, while in larvæ known as *Erichthus* — in the old wide sense of the term — there is only a single denticle between the submedian and the intermediate teeth. The larvæ of *Coronidopsis* m. established above is unknown, but the larvæ of the five other genera of the order (*Pseudosquilla*, *Lysiosquilla*, *Coronida*, *Odontodactylus* and *Gonodactylus*) belong to the *Erichthus*-type. As no specimen of *Alima* gathered by the 'Siboga' can be referred with any certainty to the adult species of *Squilla*, this larval genus is left out of consideration. But fortunately larval types belonging to the five other genera of adult animals can be determined with certainty not only to genus but in some cases to species.

Lysiosquilla Dana.

In the full-grown larvæ of this genus known to me the hand of third thoracic leg is at most only a little longer than broad and generally somewhat or even considerably broader than long, besides the surface of this hand is at least three, frequently four or more times as large as that of the quite small and oblong hand of fourth leg. By this character the fullgrown larvæ of *Lysiosquilla* are easily separated from those belonging to *Pseudosquilla*, *Odontodactylus* and *Gonodactylus*, in which the hand of third leg is conspicuously longer than broad, and its surface at most scarcely twice as large of the hand of fourth legs, and sometimes the difference in size between the hands of these two pairs of legs is considerably smaller. The larvæ of *Coronida* are as to the hands mentioned rather allied to those of *Lysiosquilla* (see later on).

In some species of this genus the older larvæ are characterized by having the carapace broad, considerably or much broader than the abdomen. This is the case in *Lysierichthus Edwardsii* Eud. & Soul. belonging to the Atlantic *Lysiosquilla glabriuscula* Lam., in *Lysierichthus vitreus* Fabr. belonging to the Atlantic *Lysiosquilla scabricauda* Lam. (see my Plankton-paper p. 75 and 77) and in *Lysierichthus Duvaucellii* Guèr., to be mentioned below. But other larval species of the genus have the carapace narrow and only a little or not broader than the abdomen. At the three stations 37, 40 and especially 41 (?) the 'Siboga' captured several larvæ in the last stage and a number of the first post-larval stage (consequently without spines on the carapace), and these post-larval specimens were generally taken in tow-net together with their larvæ and at Stat. 37 and 41 (?) among an enormous quantity of corresponding stages of a species of *Gonodactylus*, from which (and from a few specimens of similar stages of *Odontodactylus*) they are separated by the shape of telson with uropods, the shape of the merus of the raptorial claw and above all by the gigantic size of the hand of third thoracic legs as compared with the quite small hand of fourth leg. It is besides interesting to note that as to the general aspect of the carapace the larvæ of that *Lysiosquilla* are rather similar to the larvæ of *Odontodactylus* and moderately similar to those of *Gonodactylus*. But as the first post-larval stage of that *Lysiosquilla* does not possess so well developed traces of the spines on the raptorial

claw that they can be counted and as the telson with uropods is far from having obtained its final shape and equipment, I am unable to refer this stage to the adult species — if that on the whole has been established in the literature. Therefore I think that a special description with a number of figures of this larval form and its post-larval stage may be omitted as it would be of slight value.

1. *Lysierichthus Duvaucellii* Guér.

Erichthus Duvaucellii Guérin, Iconographie du Règne Animal, T. III, Crustacea, Pl. XXIV, fig. 3.
1871. *Erichthus Duvaucelli* Claus, Abhandl. K. Gesells. Wiss. Göttingen, Bd. XVI, p. 26, Taf. IV, fig. 16.
1886. *Erichthus Duvaucelli* Brooks, Challenger Rep., Zool. vol. XVI, p. 110; Pl. X, fig. 7, Pl. XI, fig. 4.
1904. *Lysierichthus Duvaucelli* Jurich, Wiss. Erg. Deutschen Tiefsee-Exp. B. VII, 6, p. 393, Taf. XXVI (II), fig. 7.

Stat. 185. September 12. Lat. 3° 20′ S., long. 127° 22′.9 E. Manipa-strait. From 1536 m. to surface; HENSEN vertical net. 5 older specimens.
Stat. 210a. September 24. Lat. 5° 26′ S., long. 121° 18′ E. 1944 m. Deep-sea trawl. 1 subadult larva, 40 mm. long.
Stat. 245. December 3. Lat. 4° 16′.5 S., long. 130° 15′.8 E. Townet, surface, 4 rather young specimens.
Stat. 276. January 9. Lat. 6° 47′.5 S., long. 128° 40′.5 E. Plankton. 1 larva, 11 mm. long.

The largest specimen, though 40 mm. long, is not quite full-grown, as the dactylus of the raptorial claw does not show vestiges of spines under the skin. CLAUS gives excellent figures of the full-grown larva, and his fig. 16*a*[1] exhibits the long and very slender raptorial claw with 7 spines beneath the skin of the inner margin of the dactylus. From this number together with the extreme size of the adult larva and the fact that they may be considered rather common in the Indo-Pacific it may be concluded with certainty that the larvæ belong to *Lysiosquilla maculata*.

Older specimens from about 27 mm. in length are characteristic; CLAUS' figures convey a good idea of the general aspect and several characters. The rostral spine is of moderate length; of the median dorsal Zoëa-spine only a vestige is present and placed very little before the posterior margin. The antero-lateral spine is short or rudimentary; the lateral spine is vestigial or small and situated somewhat longer from the antero-lateral spine than from the postero-lateral one, which is well developed though not long. In the specimen measuring 40 mm. in length the postero-lateral angles of second to fourth abdominal segment are subacute, while those of fifth segment are produced and very acute; in a specimen of about 27 mm. the postero-lateral angles of second to fourth segment are also produced backwards, subspiniform and acute. The shape of these postero-lateral angles afford excellent specific differences from rather similar large larvæ in the Atlantic belonging to *Lysiosquilla glabriuscula* Lam. and *L. scabricauda* Lam. (see my paper on the Squillidæ from the German Plankton-Expedition p. 75—79).

JURICH gives a good figure (Taf. XXVI, fig. 7) of a specimen measuring 18.6 mm. in length, but the Zoëa-spine is placed — casually or incorrectly? — too far from the posterior margin of the carapace. In specimens 11—14 mm. long the Zoëa-spine is well developed though

somewhat or considerably shorter than the lateral spine, which is very conspicuously shorter than the postero-lateral spine; the antero-lateral spine is always short though very distinct. The rostrum and the postero-lateral spines are longer in proportion to the length of the animal than in large larvæ. The postero-lateral angles of second to fifth abdominal segment are produced into acute spines directed backwards and on third to fifth segment besides somewhat outwards.

Coronida Brooks.

In the Plankton-paper (1895) I described (p. 81) *Smerdis armata* Leach as *Coronideríchthus armatus*, pointing out that it must belong to the genus *Coronida* and to its single species known from the Atlantic, viz. *C. Bradyi* A. M.-Edw. The 'Siboga' captured a couple of specimens belonging to the same genus.

1. *Coronideríchthus bituberculatus* Hansen.

1871. *Erichthus armatus* Claus, Abh. K. Gesells. Wiss. Göttingen, B. XVI, p. 25 (partim), Taf. IV, figs. 15, 15[1].
1895. *Coronideríchthus bituberculatus* H. J. Hansen, Ergebn. Plankton-Exp. B. II, G. c, p. 83.
1904. *Coronideríchthus bituberculatus* Jurich, Wiss. Erg. Deutschen Tiefsee-Exp. B. VII, 6, p. 394, Taf. XXVIII, fig. 3.

Stat. 109. July 5—6. Anchorage off Pulu Tongkil, Sulu-archipelago. Townet. 2 specimens.

Claus gives excellent figures of the full-grown larva, seen from the side, and from below; besides he figures the distal joints of the raptorial claw showing three spines beneath the skin along the inner margin of the dactylus. The outline of the carapace has, seen from above, a peculiar inflation or swelling at each side in front of the antero-lateral spines; seen from the side, the Zoëa-spine is long, subvertical and originates from the posterior half of the carapace which is very raised and almost conical. The specimen figured by Jurich was only 9.6 mm. long and less characteristic. The two 'Siboga' specimens are only half-grown, about 11.5 mm. long; seen from the side the carapace is rather similar to fig. 15[1] of Claus, but its dorsal margin is less curved at the middle; seen from above the lateral inflations in front of the postero-lateral spines are much less developed, though perceptible. Jurich's small specimen is somewhat similar though still a little less characteristic when seen from above. Telson and uropods in the 'Siboga'-specimens nearly as in Jurich's fig. 3, but the uropods are a little longer.

In 1895 I referred *Coronideríchthus bituberculatus* to *Coronida trachurus* v. Martens, because it was the only species of the genus known from the Indo-Pacific region. But in 1898 Borradaile established a new species which must belong to *Coronida* as *C. multituberculata*, taken at the Loyalty Isl., and in 1922 Edmondson described a third species, *C. sinuosa*, from Hawaii. This last-named species is very aberrant, and the 'Siboga'-larvæ can certainly not belong to it. Though it is impossible to decide with absolute certainty that the larvæ do not belong to *C. multituberculata* Borrad., I am tolerably sure that they must be referred to *C. trachurus* v. Martens which is known from Red Sea, Mauritius, Pelew Isl. and the Caroline-group (Kemp).

Pseudosquilla Dana.

As mentioned above, full-grown larvæ of the present genus are separated from those of *Lysiosquilla* by the shape of the hand of third thoracic leg and especially by its size as compared with that of fourth leg. They are separated from full-grown larvæ of *Odontodactylus* and *Gonodactylus* by the facts that in the two last-named genera the merus of the raptorial claw has its proximal half somewhat or considerably thickened, and its articulation with ischium not terminal but situated more or less evidently on its inner side, while in *Pseuderichthus* the proximal part of merus is slender and its articulation with ischium terminal. Though the genus comprises 12 species only two larval species can be referred with certainty to the adults, and both are named in my Plankton-paper. Besides GIESBRECHT named three larval species of which he had a single stage or some stages from the Mediterranean, but he could not refer them to the adults; finally he describes and figures a very interesting larval form which he refers with a query to *Pseudosquilla Ferussaci* Roux.

The 'Siboga' material comprises some specimens of a single well-known form; doubtful young larval specimens are omitted.

1. *Pseuderichthus communis* Hansen.

1895. *Pseuderichthus communis* H. J. Hansen. Ergeb. Plankton-Exp. B. II, G. c, p. 84—86. Taf. VIII, figs. 5—5*b*.
1904. *Pseuderichthus communis* Jurich, Wiss. Erg. Deutschen Tiefsee-Exp. B. VII, 6, p. 395, Taf. XXIX, fig. 1.

Stat. 109. July 5—6. Anchorage off Pulu Tongkil, Sulu-archipelago. Townet. 2 small specimens.
Stat. 141. August 5. Lat. 1°0′.4 S., long. 127°25′.3 E. HENSEN vertical net, from 1500 m. to surface. 1 moderately large larva.
Stat. 245. December 3. Lat. 4°16′.5 S., long. 130°15′.8 E. Townet. 2 full-grown and 2 small larvæ.

The largest larva (from Stat. 245) is 25.5 mm.

This species belongs to *Pseudosquilla ciliata* F., which has an extremely wide geographical distribution (see p. 18). Above (p. 17) it is stated that 2 specimens of the first post-larval stage without spines on the inner margin of the dactylus of the raptorial claw — the "*monodactyla*"-stage — were taken by the 'Siboga' at two stations.

Finally it may be mentioned that the 'Siboga' captured a good number of specimens in the first post-larval stage of a form which seems to belong to *Pseudosquilla*. The animals were taken in Plankton-material at Stat. 37 and on April 3 (? Stat. 41). They are about 12 mm. long and have 3 well developed spines on the inner margin of the dactylus of the raptorial claw. But among the 12 species of *Pseudosquilla* enumerated by KEMP 3 spines on the dactylus (the apical spine not included) exist only in *P. pilaensis* de Man, of which only 2 specimens are known, and I do not venture to refer the animals in the first post-larval stage and consequently far from fully developed to that interesting form.

Odontodactylus Bigelow.

While, as mentioned above (p. 39) full-grown larvæ of this genus are easily separated from those of *Lysiosquilla* by the shape and relative size of the hands of third and fourth thoracic legs, and separated from those of *Pseudosquilla* by the swollen major proximal part of the merus of the raptorial claw and the place of its articulation with ischium, I am unable to point out any really generic difference between full-grown larvæ of *Odontodactylus* and those of *Gonodactylus*. But yet a small step in that direction may be attempted.

Claus (1871) described and figured (p. 31, Taf. V, figs. 21 A an 21 A[1]) two species respectively from the Canary Islands and from the Indian Ocean; he refers them correctly to *Gonodactylus*, and *Odontodactylus* became separated from that genus many years after, viz. in 1894. Both species belong to *Odontodactylus* which is instantly recognized by having the marginal submedian teeth of telson produced as uncommonly long spines; besides the carapace has the rostrum and the postero-lateral processes very long, while its other spines are short or wanting — Jurich (1904) describes and figures (p. 396, Taf. XXVIII, fig. 4) a larval form which he names *Odonterichthus tenuicornis* n. sp.; his 3 specimens, captured in the Indian Ocean, have evidently been somewhat young, and judging from the shape of the propodus of the raptorial claw I am not sure that his reference to genus is correct.

A bottle with Plankton taken by the 'Siboga' on April 3 in from 10 m. to surface contained hundreds of larval and post-larval specimens of a species of *Gonodactylus* (see later on). Among them I found five specimens of two species of *Odonterichthus*, furthermore a single damaged specimen in the first post-larval stage and a fine specimen in probably the third post-larval stage. The last-named specimen belongs unquestionably to *Odontodactylus Hansenii* Pocock, and I am moderately — but not quite — sure that three of the larvæ and the post-larval specimen belong to the same species, while two larvæ belong to another form, not improbably to *O. scyllarus* L.

Larval Stages of *Odontodactylus* (?) *scyllarus* L.

Two half-grown specimens are to hand, taken on April 3. The largest specimen is about 13 mm. long, rostrum included. The body is rather similar to, but yet considerably more slender than, the animal shown in fig. 7*a* — which represents the last larval stage of another species described later on. The rostrum is a little longer and the postero-lateral spines of the carapace conspicuously longer than in fig. 7*a*, and the last-named spines reach to the middle of telson. The carapace differs besides from that shown in figs. 7*a*—7*b* in having no Zoëa-spine and no spine on the lower margin of the postero-lateral spines, but a small spine on the posterior margin a little above each postero-lateral spine. The raptorial claw is extremely characteristic (Pl. II, fig. 6*a*); the merus is about four and a half times as long as deep and tapers considerably from rather near the distal end to the rounded base; the propodus is half as long again as the merus, extremely slender and a little thicker towards both ends; the dactylus is extremely slender and somewhat shorter than the propodus. The third and fourth thoracic legs have arrived at a moderate size, with their hands well marked off, but the whole structure is still as a little

sacciform and not modelled as in the old stage. The telson (fig. 6*b*) is a little more narrow in proportion to its length than that shown in fig. 7*f*, but otherwise on the whole similar. The uropods have the characteristic shape found in *Odontodactylus* (and *Gonodactylus*); the outer process of the plate of the peduncle is extremely long, slender and straight, but in this stage it reaches only to the intermediate marginal tooth of telson, while the inner process is very short; the exopod reaches slightly beyond the base of the outer peduncular process and has only a couple of marginal spines, while second joint is not marked off; the endopod is somewhat longer than the exopod.

It may be noted, that 3 specimens of the same larval species were taken by the 'Siboga' at Stat. 109 and 3 specimens at Stat. 37, surface; the largest specimen is 17.5 mm. The Copenhagen Museum possesses the same species from the south-western part of the Indian Ocean about at Lat. $21^1/_2°$—22° S., long. $57^3/_4°$ E., and from the Gulf of Yeddo. The largest specimen, which is from the last-named locality, has lost a part of rostrum, and its length has originally been at least 25 mm. It differs from the half-grown 'Siboga' specimens in having almost the proximal two-thirds of the merus of the raptorial claw considerably thickened, and its articulation with ischium is not really terminal, but in the main on the inner side, while the propodus has still preserved its great length and slenderness. The hand of third thoracic leg is considerably longer than broad, and rather considerably longer than the fourth. The postero-lateral spines of the carapace reaches in this very large specimen only to the middle of fifth abdominal segment; the other spines in the main as in the half-grown specimens. On the telson the intermediate marginal teeth are long and very outstanding. The outer process of the peduncle of the uropods reaches to the base of the submedian marginal teeth of telson, while the inner process is somewhat larger than in the half-grown specimen; finally the exopod has its second joint well developed, while the first joint has 12 marginal spines, the distal ones long.

That these larvæ belong to *Odontodactylus* goes without question; the merus of the raptorial claw and the development of the marginal spines on first joint of the exopod of the uropods in the very large specimen described are sufficient proofs. And I am apt to think that they are the larvæ of the very widely distributed Indo-Pacific species *Odontodactylus scyllarus* L.

Probable Stages of *Odontodactylus Hansenii* Poc.

Last larval Stage (Pl. II, figs. 7*a*—7*f*). — The animal is 12 mm. long, the rostrum included. The carapace (figs. 7*a* and 7*b*) is, seen from above, slightly broader than the abdomen, and it has its lateral margins subparallel. The rostrum is very long, much longer than the main body of the carapace, with a number of spinules on the lower margin (figs. 7*b*); the postero-lateral spines reach about to the base of telson, and have a little from the base a somewhat small spine on the lower margin, while a small spine on the posterior margin of the carapace above the postero-lateral spines is quite wanting; the Zoëa-spine is quite small and placed on the hind margin; the antero-lateral spines are very small. The eyes are rather short and very thick. The raptorial claw is characteristic (fig. 7*c*); the merus is between three times and two and a half times as long as deep, as its proximal two-thirds are considerably thickened, while proximally it is rounded off and has the articulation with ischium on its inner side; the propodus

is conspicuously shorter than merus, moderately robust, about four times as long as deep, with a number of spinules on the margin; dactylus is slightly shorter than propodus, moderately robust and without internal vestiges of spines. Third and fourth pairs of thoracic legs well developed; the hand of third leg (fig. 7*d*) is not inconsiderably longer than broad and only somewhat larger than fourth hand (fig. 7*e*). The telson (fig. 7*f*) is a little longer in the median line than broad; the median posterior excavation is very broad and the submedian teeth slender and long, though considerably shorter than in the larvæ figured by CLAUS (op. cit. fig. 21 A). The intermediate marginal teeth are moderately small with a denticle of the base; the lateral teeth almost as large as the intermediate pair. In the uropods (fig. 7*f*) the outer process of the plate of the peduncle is extremely long, reaching a little beyond the base of the submedian marginal teeth of telson, while the inner process is a quite short and robust spine; the exopod reaches somewhat beyond the inner process mentioned, has distally on the outer margin two spines, and beneath the skin vestiges of a number of spines can be discovered.

First post-larval Stage (Pl. II, figs. 8*a*—8*b*). — The single specimen, which is somewhat mutilated, is 9 mm. long. The rostrum (fig. 8*a*) is distinctly longer than broad; its basal part is short without traces of antero-lateral angles, but the median process is long and oblong-triangular. The raptorial claw differs not perceptibly from that in the last larval stage described above, and its dactylus shows no internal vestiges of spines. Hands of third and fourth thoracic legs nearly as in the last larval stage. The telson (fig. 8*b*) differs materially in outline from that in the preceding stage, as the posterior median excavation is considerably deeper and more narrow, shaped in the main as, but still proportionately larger than, in a fully developed specimen, and the submedian teeth are triangular with a terminal movable spine; the intermediate marginal teeth are very much larger than in the larvæ, oblong-triangular. The uropods (fig. 8*b*) almost as in the last larval stage, but endopod and exopod proportionately a little longer.

This post-larval stage and the last larval stage described above belong decidedly to the same species. Whether this species belongs to *Odontodactylus* or to *Gonodactylus* I can not settle with absolute certainty, but judging from the size of the intermediate marginal teeth of telson in the post-larval stage and from the size and shape of the eyes in the last larval stage I believe they belong to *Odontodactylus*. And if so they cannot belong to *O. scyllarus* or any allied large form, but belong probably to the very much smaller species *O. Hansenii*, of which a later post-larval stage to be described presently has been taken in the same haul.

Later post-larval Stage (Pl. II, figs. 9*a*—9*d*). — The animal is 14.5 mm. long and belongs evidently to *Odontodactylus Hansenii* Pocock (on the synonymy of this species see p. 23). The rostrum (fig. 9*a*) is scarcely two and a half times as broad as long, anteriorly evenly rounded. The eyes are extremely large, as their breadth is half the length of the carapace (without rostrum). The raptorial claw (fig. 9*b*) differs mainly from that of the adult in a single feature, that the dactylus has its proximal third feebly thickened, but a protruding "heel" towards the base is rather high; the dactylus has seven quite small spines on the margin (the terminal spine not included); the merus is scarcely three times as long as deep, with the proximal two-thirds thick, vaulted and proximally rounded, as the ischium is articulated to its inner side; the propodus is a little more than four times as long as deep. Fig. 9*c* exhibits

third thoracic leg, showing the shape of the hand. Sixth abdominal segment (fig. 9*d*) has somewhat long submedian spines from well developed bosses, the intermediate spines are small and the marginal spines long. The telson (fig. 9*d*) rather little broader than long, with the lateral teeth long and slender, the intermediate teeth very long and much produced. On the surface one observes a high median keel terminating in a spine, besides one pair of submedian and one pair of intermediate keels, both well developed, while the large areas between the intermediate and the marginal keels have no protuberance. The uropods have nearly arrived at their final development; the inner process of the peduncular plate is distinctly more than half as long as the outer process; first joint of the exopod with nine marginal spines, and the distal spine as long as the well developed second joint.

Gonodactylus Latr.

On April 3 (Stat. ? 41) the 'Siboga' captured in from 10 m. to surface hundreds of specimens of five stages of seemingly a single species of *Gonodactylus*, viz. the two last larval stages and the three first post-larval stages; at Stat. 37 a still larger number of the same stages of the same species were captured at the surface. (A moderate number of larval and post-larval stages belonging to other genera were found in the same bottles and are mentioned above). Though I have examined a good number of specimens of the third post-larval stage which is more characteristic than the preceding stages, I have been unable to find *Gonodactylus*-specimens in that stage of more than a single species in the two bottles. This is emphasized as one might expect to find at least a few specimens in third post-larval stage belonging to the extremely common *G. chiragra*, but every specimen in that stage belonged to a species at least allied to *G. trigibbosus* n. sp. (see p. 36) which is very different from *G. chiragra*. And I arrived gradually and unwillingly at the supposition that all specimens from the two localities of these stages of *Gonodactylus* may belong to a form allied to *G. trigibbosus*, and most probably to a hitherto unknown species; an other possibility is, however pointed out later on (p. 48).

Last larval Stage (Pl. II, figs. 11*a*—11*d*). — The animal is 8.7 mm. long, seen from above (fig. 11*a*) almost subcylindrical. The carapace (figs. 11*a* and 11*b*) does not at the median line reach the posterior margin of the last thoracic segment, consequently the abdomen which is slightly broader than the carapace, is uncovered. The rostrum is a good deal shorter than the median line of the carapace, strong, and generally with two or three denticles below. The antero-lateral angles are produced into quite short spines; the postero-lateral spines reach scarcely to the posterior angles of second abdominal segment; a horizontal quite short Zoëa-spine projects from the hind margin of the carapace; finally a small spine projects from the hind margin just above each postero-lateral spine. The eyes are very large, with a rudiment of bipartition of the cornea. The raptorial claw (fig. 11*c*) has the merus somewhat more than three times as long as deep, its proximal half is conspicuously thickened with the proximal end broadly rounded and the articulation with ischium on its inner side; the propodus is slightly longer than the merus and moderately slender, five times as long as deep, with a number of denticles on the margin, and a small spine a little from the base; the dactylus is somewhat shorter than propodus, moderately strong with its very slender and curved terminal part somewhat long.

The hands of third and fourth pair of thoracic legs well developed and subsimilar to those in the first post-larval stage. The telson (fig. 11*d*) is a little longer than broad, on the whole subsimilar to that in the larva referred above to *Odontodactylus Hansenii*, but it differs in having the produced submedian marginal teeth conspicuously shorter. The uropods (fig. 11*d*) nearly as in *Odontodactylus*; the outer process of the peduncle is extremely long and reaches nearly to the end of the submedian teeth of telson, while the inner process is short; the exopod consists of a single joint with two marginal spines, the distal one long.

Penultimate larval Stage (figs. 10*a*—10*b*). — A specimen measures 8 mm. in length and is on the whole similar to the stage described, excepting in the following particulars. The merus of the raptorial claw (fig. 10*a*) is four times as long as deep, consequently a little less thickened than in the next stage, and the articulation with ischium is nearly terminal. The telson is half as long again as broad (fig. 10*b*), consequently more narrow than in the next stage. The uropods are considerably smaller; the outer process of the peduncle reaches scarcely to the denticle placed midway between the submedian and the intermediate teeth; exopod and endopod are also distinctly shorter in proportion to the peduncle than in the last stage.

First post-larval Stage (figs. 12*a*—12*f*). — The animals are 7.5—8 mm. long. The rostrum (fig. 12*a*) is nearly as broad as long; its median process is well developed, rather long, acute, while antero-lateral angles do not exist, as the parts in question are broadly rounded. The antero-lateral parts of the carapace scarcely produced, the outer angle therefore nearly rectangular though not sharp, and the front margin between this angle and the rostrum is situated distinctly in front of the rostral base. The raptorial claw (figs. 12*b* and 12*c*) differs much from that in the last larval stage; the merus which is a little less than three times as long as deep, has obtained the shape typical in adult specimens, having the proximal part produced backwards beyond the articulation with ischium; the propodus is only about three-fifths as long as the merus, somewhat more than three times as long as deep, thus considerably thickened and thicker towards the distal than near the proximal end; the dactylus has its proximal half somewhat, though still not much, thickened, and a deep notch somewhat from the base. The hand of third thoracic leg (fig. 12*d*) is oblong, about half as long again as broad; the hand of fourth leg (fig. 12*e*) is somewhat smaller. The telson which is somewhat longer than broad, is altered considerably in shape (fig. 12*f*); the distance between the ends of the submedian marginal teeth is very much shorter than in the last stage, and the excavation between them nearly triangular and more deep, and each tooth terminates in a movable spine; the intermediate tooth is somewhat larger though still spiniform, but the incision between the tooth and the following margin is broader and has a well developed spinule. The uropods (fig. 12*f*) are much more developed than in the last larval stage; the plate from the peduncle is broader with its outer process stronger, while the inner process is now almost half as long as the outer; the exopod has two joints, but its second joint has not yet obtained its full size, and the first joint has ten well developed marginal spines, the most distal of which projects far beyond the end of second joint.

Second post-larval Stage. — The animals are 8.5—9 mm. long. They are on the whole similar to the first stage, but differ especially in one feature, viz. the shape of rostrum which is intermediate between the rostrum of first stage and that in third stage (to be described

presently), as it possesses moderately developed antero-lateral angles. In the second stage the telson has a median keel and vestiges of intermediate keels, but they are still rather undeveloped.

Third post-larval Stage (Pl. II, figs. 13*a*—13*d*). — The animals are 9.5 to 10 mm. long and they differ from those of first post-larval stage in several essential features. The anterior margin of the carapace is shaped and quite transverse nearly as in the first stage, consequently situated conspicuously in front of the rostral base (fig. 13*a*), but the rostrum itself is altered; it is slightly longer than broad, with the rather slender median spine longer and more marked off, while the somewhat short basal part of the rostrum has the margin at each side of the median spine nearly transverse and straight, and the antero-lateral angles a little produced but obtuse.

The raptorial claw (fig. 13*b*) has the propodus still more inflated distally and is only three times as long as deep; the dactylus has the proximal half much more inflated than in first stage, but the notch is well developed. The posterior margin of sixth abdominal segment is distinctly concave. The telson (fig. 13*c*) is much altered; each intermediate marginal tooth is much more robust and situated considerably nearer to the end of the submedian tooth; the median marginal excavation is somewhat altered in shape, looking less deep but continued forwards in the median line as a quite short fissure. The surface of telson has three bosses; the median boss is very broad and begins near the base of telson but is only half as long as its median line; each boss of the more lateral pair goes much more backwards, but ceases about at a line between the lateral marginal teeth; as to the length of these bosses I find some individual variation, but they cease always far from the posterior margin of the telson. The uropods (fig. 3*d*) differ from those in first stage in some minor particulars; the plate of the peduncle is broader, with its outer process somewhat shorter and not twice as long as the inner; the second joint of the exopod is comparatively larger, reaching to the end of the distal marginal spine of first joint.

The shape and especially the surface of the telson of this third post-larval stage differs so much in aspect from the telson of a very small *G. chiragra*, that the animals cannot belong to this species. Already the fact that the antero-angles of the carapace are not produced forwards, with their angles well in advance of the rostral base, proves that the animals cannot belong to the *G. chiragra*-group. I must, however, confess that I am unable to refer them to any species hitherto known. If the adult has been described in the literature it must differ in some conspicuous particulars from that of the third post-larval stage. And this stage shows more affinity to *G. trigibbosus* n. sp. (Pl. II, figs. 5*a*—5*b*) than to any other species. There is of course the possibility that the animals in third post-larval stage do not belong to the same species as those in first and second post-larval stages, and the shape of the telson in these stages points in that directions; if so both larvæ and first and second post-larval stages belong probably to *G. chiragra*, while the animals in third post-larval stage to an unknown species, but in spite of considerable trouble I cannot decide these questions with any certainty.

EXPLANATION OF THE PLATES.

PLATE I.

Fig. 1. *Squilla verrucosa* n. sp.

Fig. 1*a*. Anterior part of the body, with eyes and the peduncles of left antennula and antenna of an adult male, from above; × 4.
Fig. 1*b*. Left eye, mainly from the outer side, of the same specimen; × $^{11}/_{2}$.
Fig. 1*c*. Major part of right raptorial claw of the same male, from the outer side; × 3.
Fig. 1*d*. Four posterior thoracic segments of the same male, from above; × $^{10}/_{3}$.

Fig. 2. *Squilla ambigua* n. sp.

Fig. 2*a*. Anterior half of the body of a male, from above; × $^{13}/_{3}$.
Fig. 2*b*. Major part of right raptorial claw, from the outer side; scarcely × 5.
Fig. 2*c*. Sketch of fourth thoracic segment, from the left side.
Fig. 2*d*. Posterior abdominal segments with telson and left uropod, from above; scarcely × 5.
Fig. 2*e*. Telson from below; scarcely × 5.

Fig. 3. *Squilla incerta* n. sp.

Fig. 3*a*. Anterior half of the body of a rather small male, from above; scarcely × 5.
Fig. 3*b*. Major part of left raptorial claw of the rather small male, from the outer side; × $^{11}/_{2}$.
Fig. 3*c*. Posterior abdominal segments with telson and left uropod of the rather small male, from above; scarcely × 5.

Fig. 4. *Squilla indica* n. sp.

Fig. 4*a*. Anterior part of the body of the female, from above; × 5.
Fig. 4*b*. Major part of left raptorial claw of the female, from the outer side; scarcely × 4.
Fig. 4*c*. Ventral plate of left uropod of the same female, from above; × 5.

Fig. 5. *Squilla Schmeltzii* A. M.-Edw.

Fig. 5*a*. Anterior part of the body of a male, from above; × 8.
Fig. 5*b*. Posterior abdominal segments with telson and right uropod of a male, from above; × 8.

Fig. 6. *Squilla Sibogæ* n. sp.

Fig. 6*a*. Carapace and the free thoracic segments of a male, from above; × 3.
Fig. 6*b*. Anterior part of the body of the same male, from above; × 4.
Fig. 6*c*. End of the extremely long antennular segment with ocular segment, left eye and proximal part of left antennula of the same male, from the left side; × 4.
Fig. 6*d*. Major part of right raptorial claw of the same male, from the outer side; × $^{7}/_{2}$.
Fig. 6*e*. Posterior abdominal segments with telson and left uropod of the same male, from above; × $^{10}/_{3}$.

Fig. 7. *Coronidopsis bicuspis* n. gen., n. sp.

Fig. 7*a*. Anterior part of the body of the female, from above; × $^{11}/_{4}$.
Fig. 7*b*. Front end of carapace, rostrum, and eyes of the female, from above; × 4.
Fig. 7*c*. Major part of left raptorial claw of the female, from the outer side; × $^{10}/_{3}$.
Fig. 7*d*. Posterior abdominal segments with telson and left uropod of the female, from above; × $^{11}/_{3}$.
Fig. 7*e*. Telson of the same female, from below; × $^{11}/_{3}$.
Fig. 7*f*. Outline of one of the ventral processes of the telson, from the side.
Fig. 7*g*. Major part of sympod with its ventral plate and the endopod of left uropod, obliquely from below; scarcely × 4.

1. Squilla verrucosa n. sp. 2. S. ambigua n. sp. 3. S. incerta n. sp. 4. S. indica n. sp.

5. S. Schmeltzii A.M.-Edw. *6. S. Sibogæ n. sp. 7. Coronidopsis bicuspis n. gen., n. sp.*

H. J. Hansen del. *J. Britze sc.*

PLATE II.

Fig. 1. *Gonodactylus drepanophorus* de Man.

Fig. 1*a*. Left uropod, from above; × 12.

Fig. 2. *Gonodactylus strigatus* n. sp.

Fig. 2*a*. Anterior end of carapace with rostrum, from above; × 14.
Fig. 2*b*. Posterior abdominal segments with telson and left uropod, from above; × 14.

Fig. 3. *Gonodactylus pulcher* n. sp.

Fig. 3*a*. Rostrum, from above; × $^{9}/_{2}$.
Fig. 3*b*. Posterior abdominal segments with telson and left uropod, from above; × 5. Setæ on the uropod omitted.

Fig. 4. *Gonodactylus excavatus* Miers.

Fig. 4*a*. Posterior half of telson, from above; × 11.

Fig. 5. *Gonodactylus trigibbosus* n. sp.

Fig. 5*a*. Front margin of carapace with rostrum, from above; × 10.
Fig. 5*b*. Posterior abdominal segments with telson and left uropod, from above; × 8. Setæ on the uropod omitted.

Figs. 6—9. *Odontodactylus*-stages.

Fig. 6*a*. Left raptorial claw of a half-grown larva, from the left side; × 13. — The larva belongs not improbably to *O. scyllarus*.
Fig. 6*b*. Left lateral margin of telson with uropod of the same half-grown larva, from above; × 19.
Fig. 7*a*. Last larval stage of another species, from above; × $^{23}/_{4}$.
Fig. 7*b*. Carapace of the same stage, from the left side; × $^{16}/_{3}$.
Fig. 7*c*. Left raptorial claw of the same last larval stage, from the side; × 9.
Fig. 7*d*. Third left thoracic leg of the same last larval stage, from the side; × 19.
Fig. 7*e*. Fourth left thoracic leg of the same last larval stage, from the side; × 19.
Fig. 7*f*. Posterior abdominal segments with telson and left uropod of the same last larval stage, from above; × 13.
Fig. 8*a*. Front margin of carapace with rostrum of first post-larval stage, 9 mm. long, from above; × 16.
Fig. 8*b*. Posterior abdominal segments with telson and right uropod of the same specimen, from above; × 13.
Fig. 9*a*. Anterior part of the body of a later post-larval stage, 14.5 mm. long, of *O. Hansenii*, from above; × $^{13}/_{2}$.
Fig. 9*b*. Left raptorial claw of the same specimen, from the side; × 9.
Fig. 9*c*. Posterior abdominal segments with telson and left uropod of the same specimen, from above; × $^{13}/_{2}$.

Figs. 10—13. *Gonodactylus* sp.

Fig. 10*a*. Left raptorial claw of the penultimate larval stage, from the side; × 15.
Fig. 10*b*. Posterior abdominal segments with telson and left uropod of the penultimate larval stage, from above; × 21.
Fig. 11*a*. Last larval stage, from above; × $^{15}/_{2}$.
Fig. 11*b*. Carapace of the last larval stage, from the left side; × 8.
Fig. 11*c*. Left raptorial claw of last larval stage, from the side; × 15.
Fig. 12*a*. Anterior part of the body of the first post-larval stage, from above; × 11.
Fig. 12*b*. Left raptorial claw of the first post-larval stage, from the outer side; × 14.
Fig. 12*c*. Distal joints of the raptorial claw shown in fig. 12*b*; × 21.
Fig. 12*d*. Third left thoracic leg of the first post-larval stage, from the side; × 23.
Fig. 12*e*. Fourth left thoracic leg of the first post-larval stage, from the side; × 23.
Fig. 12*f*. Posterior abdominal segments with telson and left uropod of the first post-larval stage, from above; × 18.
Fig. 13*a*. Anterior part of carapace with rostrum of third post-larval stage, from above; × $^{23}/_{2}$.
Fig. 13*b*. Distal joints of left raptorial claw of third post-larval stage, from the side; × 21.
Fig. 13*c*. Posterior abdominal segments with telson of the same third post-larval stage, from above; × $^{23}/_{2}$.
Fig. 13*d*. Left uropod of the same third post-larval stage — same specimen — from above; × 19.

1. Gonodactylus drepanophorus de Man. 2. G. strigatus n. sp. 3. G. pulcher n. sp. 4. G. excavatus Miers.

5. G. trigibbosus n. sp. 6–9. Odontodactylus-stages. 10–13. Gonodactylus-stages.

H. J. Hansen del. *J. Britze sc.*